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NATIONAL MUSEUM MELBOURNE

The Journal of the Department of Agriculture of Victoria, Australia.

April, 1924.

PRINCIPAL CONTENTS

Development of Grass Lands

Hay Stack Building Competition

Nhill Crop and Fallow Competition

Treatment of Wheat for Smut

Tobacco Culture

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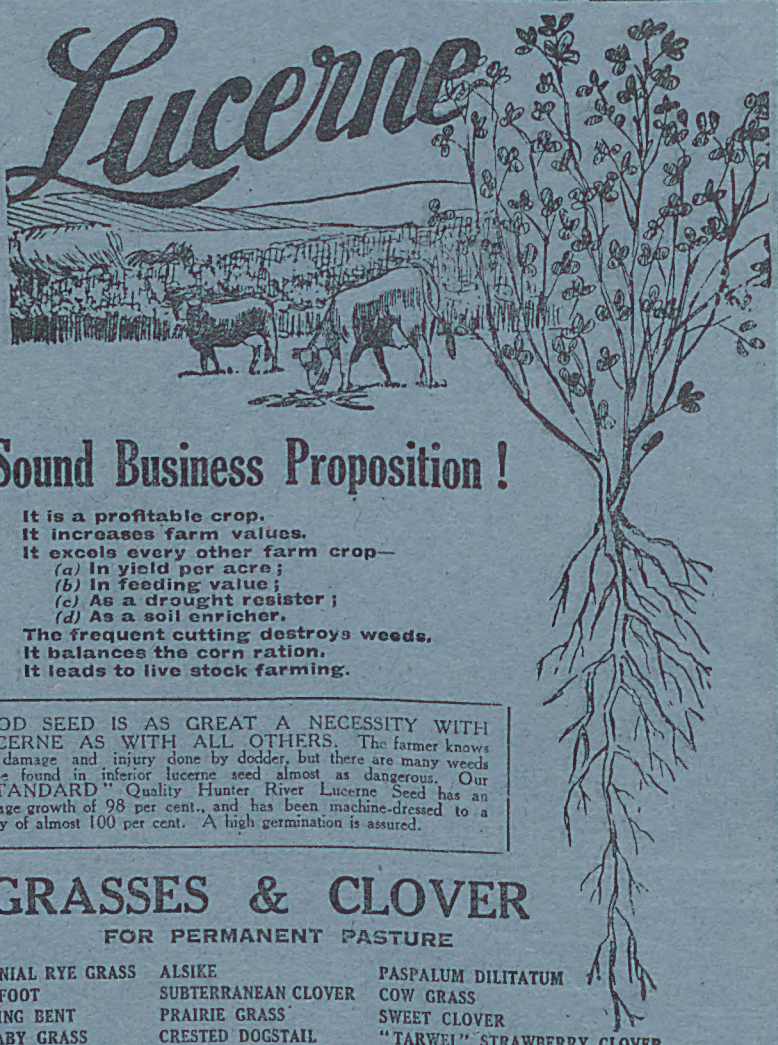

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OF

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VICTORIA, AUSTRALIA.

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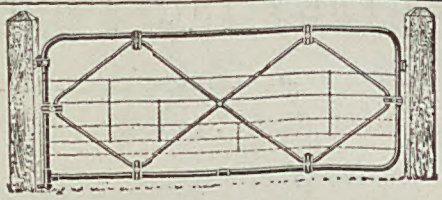

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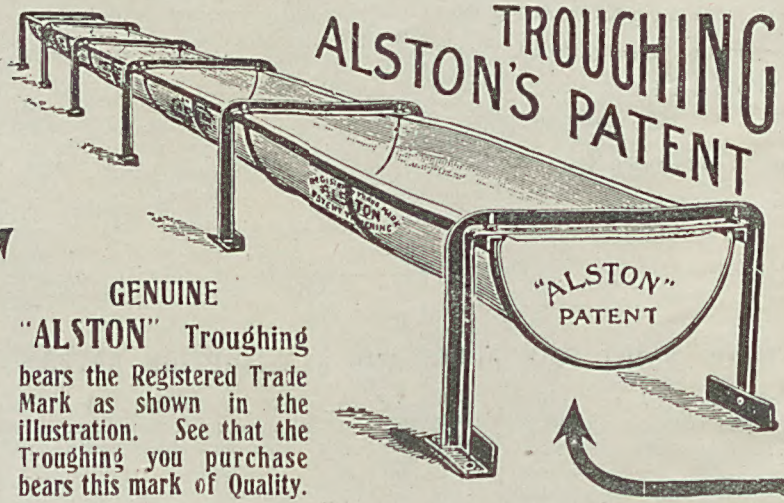

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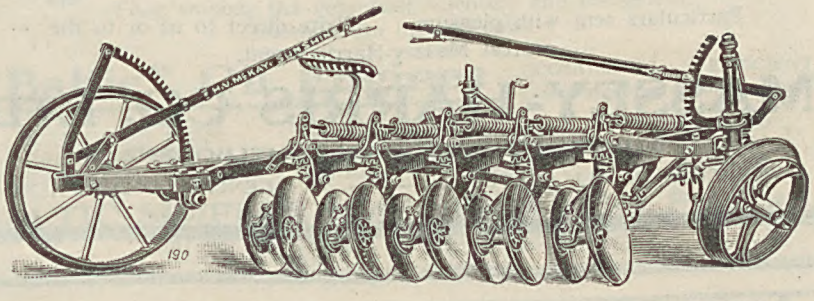

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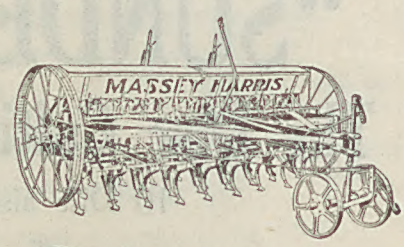

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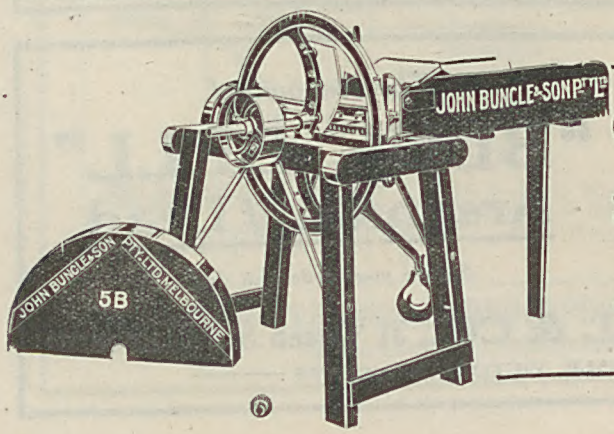

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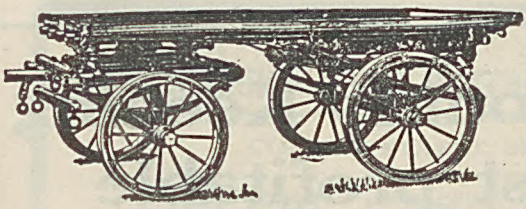

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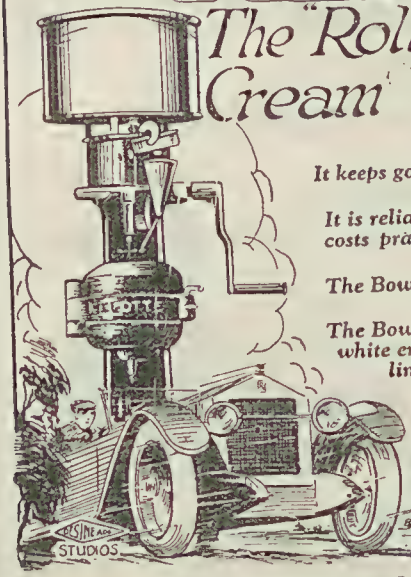

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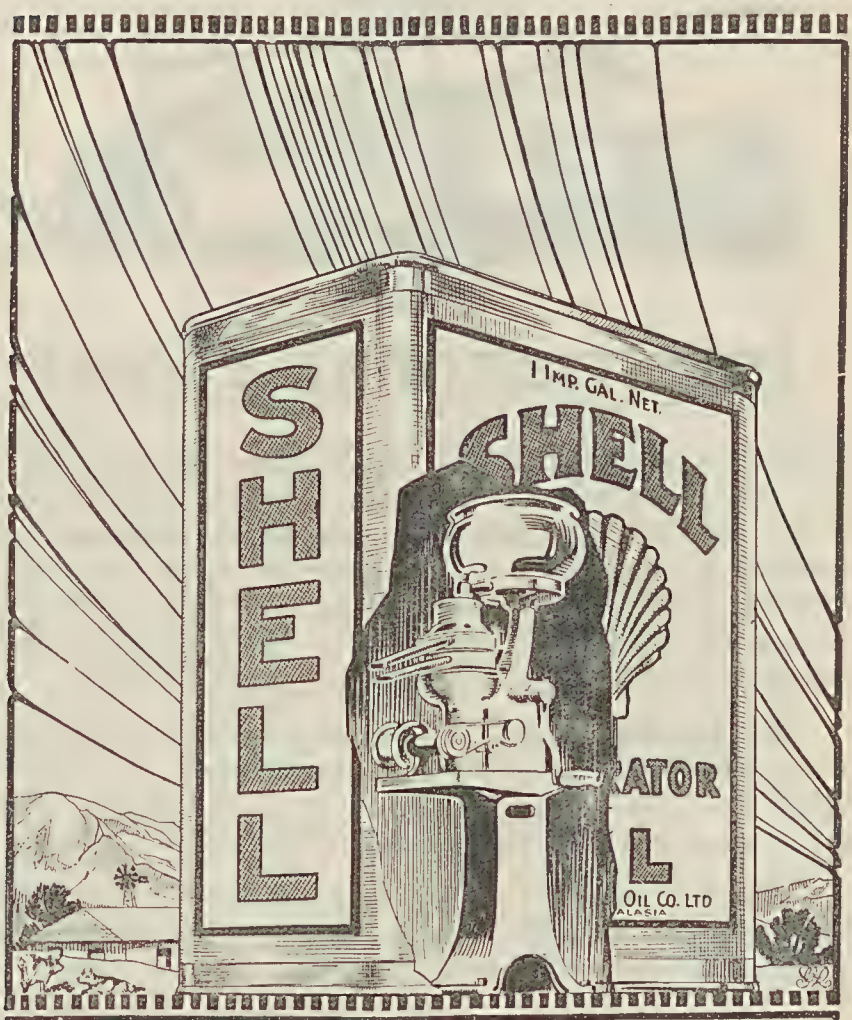

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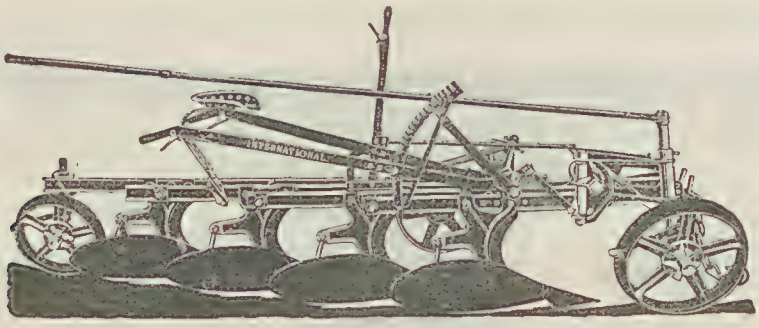

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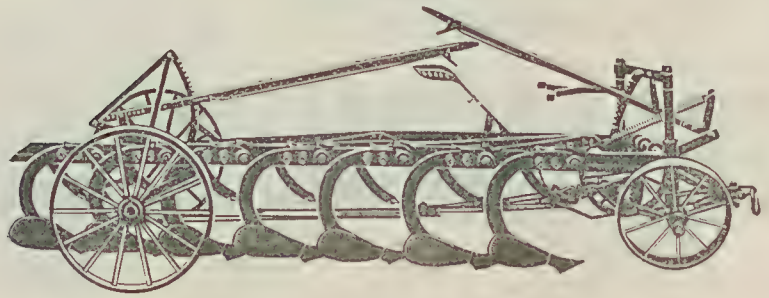


NATIONAL MUSEUM MELBOURNE

THE JOURNAL

OF THE

Department of Agriculture

OF

VICTORIA.

Vol. XXII. April, 1924. Part 4.

DEVELOPMENT OF GRASS LANDS.

By A. E. V. Richardson, M.A., D.Sc., Agricultural Superintendent.

The natural pastures of Australia are the basis of national income, for they support practically the whole of the sheep and cattle of the country. As wool and live-stock contribute in such a large proportion to the wealth of the country, the study of the principles underlying the successful production of grass is of great importance. Grass is nature's forage, the healthiest and most nutritious food for stock.

Australia's Heritage of Grasses and Fodder Plants.

Australia's native grasses are justly famous for their grazing and their drought-resistant qualities. They are noted for producing the finest and best wool in the world, and for withstanding great extremes of heat and drought. No other plants have proved equal to our own for the drier parts of Australia. Other countries, notably the United States, have imported these plants, and cultivated them extensively in the drier areas. The success of the pastoral industries of Australia are dependent on the native grass pastures, the indigenous salt bushes, and other edible forage plants; therefore it is essential that a close study should be made of these valuable indigenous plants.

Though Australia has a wealth of native grasses and fodder plants, there are relatively few edible leguminous plants, and no indigenous plants of the genus *Trifolium*—the clover family. The clovers and trefoils greatly improve the succulence and the nutritive value of pastures, and materially assist in improving the fertility of the soil because of their capacity to gather nitrogen from the air.

Though the pasture plants of the drier portions of Australia are unrivalled for their grazing and wool-producing value, it is true that in the moister coastal region introduced grases and fodder plants thrive exceptionally well. While, therefore, we should continue to rely on our native grasses for the great bulk of our pasturage, we should not

perennial rye, cocksfoot, timothy, specially adapted to different soils and climates, or suited to special uses, such as hay or pasture, will be available. Work is in progress at the State farms to breed varieties of Wimmera rye grass (*Lolium subulatum*). This grass, as grown in Victoria, has been shown to be exceedingly variable, and a number of distinct types have been isolated.

Economic Value of Pastures.

The great economic feature of pastures is that they provide a method of feeding live-stock at low cost because of the perennial nature of the grass, and because little labour is required once the pasture is established. But this does not mean that on the farm the sole use of pasture grasses is necessarily the most profitable method of raising feed. A pasture will be profitable where the cost of producing cultivated foodstuffs is unduly high by reason of remoteness from a railway, or on steep land where cultivation would cause it to scour. It must be borne in mind that grass land invariably produces less dry matter per acre than cultivated crops, so that the price of the land determines whether it should be left in grass or devoted to crop production. The wheat-grower can afford to pay from £15 to £20 and even more per acre for Wimmera wheat land, but if such land were used entirely for grazing it might be difficult to earn interest on even £8 per acre. In some parts of Victoria cultivated pastures are essential in reclaiming timbered forest areas, *e.g.*, Beech Forest and Gippsland. Unless grasses are sown immediately after the timber is burnt, bracken fern rapidly takes possession of the land.

Cultivated pastures, in common with native pastures, help to restore the fertility of the soil depleted by more or less continuous cropping. This is particularly true with respect to the restoration of nitrogen and organic matter. But with respect to mineral elements of nutrition, grazing does not add a single pound of mineral nutrients to the soil, though the grazing of pastures may lead to a concentration of mineral nutrients near the surface owing to the action of the deeper rooted grasses in bringing these from the under sub-soil. Hence, under grazing, the soil will increase in organic matter and in nitrogen (if clovers form a portion of the herbage), but without supplementary supplies in the form of artificial manures, the total stock of mineral nutrients in the soil must diminish. There are certain types of land which are best left in pasture. These are—(*a*) hilly land subject to erosion, (*b*) low-lying country subject to flooding, (*c*) rocky or stony land, (*d*) swamp land, (*e*) heavy clay soils that can be tilled only at considerable expense. Even on high-priced land which could be readily tilled the sowing of permanent pastures may be very profitable. Cultivated pastures furnish feed at low cost, are essential in reclaiming certain types of land, and are especially suitable in certain systems as temporary pastures.

Deterioration of Grass Lands.

It is a matter of common observation that many of our native pastures show signs of deterioration. The quality of the herbage has fallen off, and, in many cases, the live-stock show evidences of malnutrition. Instances of this may be seen in every district, but the most striking cases are those in the older settled areas of good rainfall. Natural pastures deteriorate in several ways—

1. Overstocking and injudicious grazing.

2. Continual removal from the soil of the elements of nutrition by the annual crop of wool, lambs, and fat stock without the replacement of these nutritive elements by means of fertilizers. In addition, in the heavier rainfall districts mineral nutrients, *e.g.*, nitrates and lime, are actually leached out of the soil by the heavy rains.

Let us briefly consider these cases.

Overstocking.

By injudicious grazing and overstocking the better and finer grasses tend to disappear, and poorer types of indigenous vegetation and weeds are left in possession of the land. Overstocking is bad enough in normal seasons, but in drought years it leads to disastrous results. In such years the better types of native grasses are eaten or killed out owing to their slow growth and non-seeding habits. These grasses are replaced by such plants as barley grass (*Hordeum murinum*), the useless soft Brome (*Bromus mollis*), barren fescue (*Festuca Bromides*), thistles of various kinds, Cape weed, and plants of low grazing value. The spread of noxious weeds, *e.g.*, St. John's Wort (*Hypericum*) in the North-East, Hoary cress (*Lepidium draba*) in the Werribee and Horsham plains, Stinkwort (*Inula graveolens*) in the Korong Vale district, Lobelia on the Western plains, has lowered the grazing value of many fine pastures, and has in places detrimentally affected land values.

Even in normal times many stock-owners carry stock in such large numbers that the good grasses have no chance to seed, with the result that the better grasses are gradually replaced by introduced or noxious herbage of lower grazing value than the original pasture. It is natural that the grazier should endeavour to carry as large a number of stock as possible, but though he may gain a temporary advantage with heavy stocking, in the long run the financial results must be unsatisfactory, as the grazing value of the pastures will steadily deteriorate. Pastures should neither be overstocked nor grazed in large areas. Comparatively small paddocks compel stock to graze the herbage uniformly, and prevent them eating only the best of the pasture, and, further, by their use pastures may be rested. Drought years will always seriously affect the pastures, but the evil effects of drought may be greatly lessened by the conservation of fodder in good seasons, improvement in the water supply, increase of irrigation areas, provision of greater transport facilities, which would permit of speedy agistment of stock in such years. In favorable years millions of acres in the interior are covered with grass and herbage in such profusion as to be beyond the power of the stock to consume it. Enterprising stock-owners have cut quantities of grass hay, and made silage as a stand-by for droughty years. This method of conserving the surplus, combined with improvement in the water supply and provision of better transport facilities, will greatly minimize the losses of stock and the deterioration of the pastures which follow every severe drought.

Depletion of Soil in Mineral Nutrients.

The continual removal of the elements of nutrition from the soil by annual crops of wool, lambs, and fat stock sold off the farm without replacement of certain mineral nutrients by artificial fertilizers, will reduce the fertility of both rich and poor soils. This condition will be most evident in the older settled districts of the State, and especially in the moister localities, for in these areas the drain on the soil nutrients is more continuous, and the losses by leaching are

considerable. The amount of mineral nutrients removed from the land by the annual crops of live-stock is considerable. Of these nutrients the phosphates are of special importance on account of the low phosphate content of Australian soils. We may roughly calculate the extent of the depletion of our soils in this important soil nutrient. For the past 60 years the average sheep population of Victoria has been approximately 11,000,000, and that of the cattle population 1,400,000. The numbers of stock slaughtered in Victoria are not available for the early years, but a fair average for the past 60 years would probably be 3,000,000 sheep and 280,000 cattle annually. The average amount of phosphoric acid in a sheep carcass is 2½ lbs., and in a cattle carcass 15 lbs. Hence each year the total amount of phosphoric acid removed from the farms by the animals slaughtered would be 5,223 tons. If we add the amount removed by pigs and rabbits, and also the amount removed

Grass Plot at Farm of Messrs. Osborne Bros., Portland. (Season 1923.)

Plot on left was top-dressed with superphosphate at rate of 2 cwt. per acre. Plot on right was not top-dressed. Note the luxuriant growth of clovers in top-dressed plot.

as milk, cream, cheese, and wool, the total amount would probably exceed 6,000 tons. This amount of phosphoric acid has been removed mainly from the grass lands during the past 60 years. Thus, throughout that period, something like 360,000 tons of phosphoric acid, which is equivalent to 1,800,000 tons of superphosphate, has been annually taken from the soil, and most of this material has been removed from the pasture lands.

As a very small proportion of our grass lands and pastures has received any addition of phosphate in the form of artificial manures, it would appear that to restore the phosphate content of the soil to what it was in 1860, nearly 2,000,000 tons of superphosphate must be added to Victorian pasture lands.

In addition to the removal of mineral nutrients by animals there are losses by leaching from the soil, especially in regions of heavy rain-

fall. The main nutrients washed from the soil are nitrates and lime. No figures are available as to the extent to which these constituents are removed in Victoria. At Rothamsted, on a rainfall of 28 inches, the losses of carbonate of lime from the soil by leaching have been shown to be no less than 8 cwt. per annum. Fortunately, both phosphoric acid and potash are firmly held by the soil, and the losses of these constituents by leaching are negligible.

Improvement of Grass Lands.

Grass lands may be improved in three ways—

(1) Sowing down with native or introduced grasses.

(2) Growing a cereal or root crop, and using liberal dressings of fertilizers.

(3) Top-dressing the pastures with suitable fertilizers, *e.g.*, superphosphate, or with certain soil amendments, *e.g.*, lime or gypsum.

1. Sowing Down with Native or Introduced Grasses.

The first method of improving the pastures is the sowing down of lands with native or introduced grasses.

(1) *Native Grasses.*

Over the greater part of the Continent the climatic conditions are too severe for the successful sowing of introduced grasses. Only the native grasses and fodder plants will thrive on the drier areas. The growing of introduced grasses and clovers is only possible in the higher rainfall areas—the coastal region and the highlands. The seeding of native grasses is a difficult and expensive matter on account of the low vitality of the seed, *i.e.*, its low germinating power and the scarcity and high price of the grass seed on the market. The germination of seeds of certain species, *e.g.*, *Danthonia* (the Wallaby grasses) and *Anthisthiria* (Kangaroo grasses) is usually very low, fresh samples of seed often giving germination percentages of only 10-20 per cent. The *Andropogon* (Blue grass) and *Panicum* (the Panic grasses) show higher vitality, as do also the various species of *Astrebla* (Mitchell grasses).

The type of native grass that can be sown to best advantage is dependent mainly on the amount of rainfall and its seasonal incidence.

In the summer rainfall region of Northern Australia the dominant species are the Panic grasses (*Panicum*), Mitchell grasses (*Astrebla*), the Blue grasses (*Andropogon*) and the various species of *Erianthus*.

In the winter rainfall zone of Southern Australia the predominating native grasses are the various species of *Danthonia* (Wallaby grasses), *Agrostis* (the Bent grasses), *Anthisthiria* (Kangaroo grasses), *Stipa* (the Spear grasses), *Eragrostis*, and *Poa*. The various species of *Danthonia* are, perhaps, the most useful of grasses suited to the southern areas. They furnish a great quantity of winter feed, which is highly palatable and nutritious for sheep feed. The Kangaroo grasses are very widespread, but are somewhat coarse, and are very common on protected areas, *e.g.*, forest and railway reserves. The Stipas or Spear grasses grow rapidly, and furnish an abundance of sheep feed during the greater part of the year. The seed of several species is very troublesome to sheep because of its pointed nature and it coarse twisted awn, which has remarkable penetrating power. This grass seed is specially detrimental to young lambs, as it may injure the eyes, and certainly penetrates the skin and lowers the value of the carcass. Every effort should be made to market the lambs before the grass seed begins to ripen.

Poa, *Agrostis*, and *Eragrostis* are found in the cooler regions of the State, and provide good feed for stock.

In the drier parts the salt bushes are of considerable importance. These are great drought resisters, and are highly adapted to hot dry localities and soils with high saline content. Of the various genera *Atriplex*, *Kochia*, and *Rhagodia* are of greatest economic importance. Victoria has ten species of *Atriplex*, six of *Kochia*, and five of *Rhagodia*. One of the most important species of *Atriplex* is *A. Semibaccata*, a spreading prostrate plant which has been introduced and cultivated in California with considerable success.

It is a curious fact that while California imports seed of these Australian fodder plants for cultivation on the drier lands, we in Australia are indifferent to the cultivation either of these edible forage plants or our very valuable native grasses.

There is no doubt that cultivation would greatly improve the native grasses in succulence and bulk. This may be seen from the excellent growth which they make when cultivated in small grass garden plots. There is little doubt, too, that good seeding habits would follow from systematic cultivation and selection.

A great field of work awaits investigation in the improvement of Australian grasses. The pastoral industry is such a valuable asset that every means should be taken to conserve our native grasses and to aim at improving them in bulk, succulence, seeding capacity, and in stock-carrying capacity.

(2) *Introduced Grasses.*

In the moister regions of Australia—the coastal areas and the highlands—the growth of introduced grasses offers a sure means of increasing the stock-carrying capacity.

For the areas dependent on summer rains, the summer growing grasses, *e.g.*, *Paspalum*, Rhodes grass (*Chloris*), &c., are extensively used. Both these grasses are extensively grown in New South Wales.

For areas within the winter rain region, *i.e.*, the Southern Coast of Australia and the adjacent highlands, perennial rye grass, cocksfoot, prairie grass, and Kentucky blue grass are the most useful grasses, and white, perennial red, and alsike, the most valuable of the clovers. On rich coastal flats strawberry clover (*T. fragiferum*) is a most valuable clover, and on relatively poor land subterannean clover (*T. subterraneum*) has proved of great value.

For the lighter rainfall areas, Wimmera rye grass (*Lolium subulatum*) is worthy of trial.

The climatic conditions of Victoria are not such as to render the establishment of permanent grass lands an easy problem.

In the preparation of the soil for a crop that is to occupy the land for many years it is sound practice to do the work thoroughly. The wheat-grower now spends as much as fifteen months work on the preparation of a fine, firm, well consolidated seed bed for a single crop of wheat. The permanent grass crop which will occupy the land for many years should have at least an equally thorough preparation. The main requirements are a well cleaned, firm, mellow seed bed, in fine tilth and condition To secure such a seed bed under Victorian conditions, it will be necessary to precede the grass crop either by a well-worked bare fallow, or by a fallow crop, preferably a root crop, which has been liberally manured and frequently intertilled. Either of these would make an excellent preparation for the grass crop.

In the case of wet low-lying areas some form of drainage, either surface or underground, is essential to secure vigorous healthy growth of the pasture.

If the grower of grass could be induced to prepare the land with the same thoroughness as the wheat-grower works his land, a good germination and successful establishment of a pasture would be ensured.

The selection of suitable grasses for a permanent pasture is a difficult problem. The soils and climatic conditions vary very widely in Victoria, and each set of conditions should be experimentally tested before the best mixture can be determined.

Grasses are divided into top or bottom plants, according to the position they occupy in the sward. The tall, strong growing grasses, *e.g.*, cocksfoot, tall oat grass, are top grasses, while the dwarf varieties *e.g.*, sheeps fescue, foxtail, and crested dogstail form the sole or bottom herbage. For good pasturage top and bottom grasses should be included, though for hay mixtures tall varieties should predominate.

Grass seeds may be sown in spring or autumn, but in most districts the spring months and summer are too dry to insure rapid germination and establishment before the summer sets in. Early autumn sowing will usually give best results. Usually the best results are obtained without a nurse crop, though under certain circumstances the use of a nurse crop may be advisable. In lighter rainfall country the growing of a nurse crop should be dispensed with.

The method of seeding a grass crop is of importance. Whether the seed is sown by broadcasting, by the seed barrow, or by a grass seed attachment to the drill, it is of importance that it be sown as shallow as possible, and, if possible, the seeds should be barely covered. On a fine, well prepared seed-bed the use of a brush harrow or a very light tined harrow will be sufficient to cover them.

2. Improvement of Grass Land Through the Use of Cereal and Root Crops.

The second method of developing grass lands—feeding the grass through the use of liberal dressings of fertilizers applied to cereals, *e.g.*, wheat (in the north), oats, roots or fodder crops (in the south)—is practicable over the whole arable area of the State. There are large areas of country in the western parts of the State where the stock-carrying capacity of the land has been greatly increased by ploughing up the virgin sod, sowing an oat or a wheat crop with a liberal dressing of superphosphate, and allowing the land to revert again to pasture. The herbage has greatly increased both in quantity and quality as a result of this treatment, and the stock-carrying capacity of the land has been increased. On many of the large sheep stations on the Western plains this practice has been found to be most advantageous.

In the wheat belt there is no question that the stock-carrying capacity of the farm is greatly increased by the use of liberal dressings of superphosphate on the wheat crop. Experience has shown that the use of liberal dressings of superphosphate not only guarantees a full wheat crop, but materially stimulates the stock-carrying capacity of the grass and herbage that follow the wheat. This leads to increased stock-carrying capacity, more sheep being kept on the wheat farm, and this, in turn, assists the farmer to secure higher wheat yields.

For arable areas in a large rainfall country this is undoubtedly the best means of securing an increase in the stock-carrying capacity of the farm.

3. Top-dressing as a Means of Developing Grass Lands.

This is the most direct method of immediately securing increased returns from our grass lands, and is capable of wide application throughout Victoria. It is in the areas of more liberal rainfall, however, that the effects of top-dressing will be most marked.

There are several reasons for this. The moister regions of the State have been longer settled and more heavily stocked than the lighter rainfall country. Hence the drain on the mineral constituents of the soil has been heavier and more continuous that on the lighter rainfall areas. Moreover, losses by leaching, particularly of nitrogen and lime, have been heavier in these areas.

Top-dressing Experiments at Farm of Mr. L. McDonald, Purnim East. (Season 1923.)

Plot on left was dressed with superphosphate at rate of 2 cwt. per acre; plot on right received no top-dressing.

It is commonly believed that grazing improves the fertility of the soil. It is well to understand precisely what grazing does. Plants gain 95 per cent. of their dry matter from the atmosphere, and only 5 per cent. from the soil. The growing of plants and the decomposition of their residues will cause the soil to become richer in organic matter but not in mineral nutrients. There may be a transfer of mineral nutrients from the sub-soil to the surface soil, but the zone within which plants feed does not become richer in mineral nutrients. By grazing, a large amount of the organic matter in the herbage, and from 50 to 60 per cent. of the mineral matter, is returned to the soil

in the fæces of the animals. As the organic matter is obtained by the plants wholly from the atmosphere, it follows that under grazing the soil will increase its content of organic matter. The mineral nutrients, however, must show a decline by the amount removed in the wool, milk, and bodies of the animals. Hence, while the organic matter increases, the total mineral nutrients must show a decline. If these mineral nutrients are replenished and augmented through the medium of artificial fertilizers, then grazing will lead to increased fertility, but not otherwise.

Our soils are notably deficient in phosphate. They are, however, well furnished with potash and other mineral nutrients. Wheat-growers have realized how necessary soluble phosphates are for a wheat crop, and no wheat-grower would now attempt to grow a wheat crop without the use of superphosphate. Grass needs phosphate as much as

Cross-bred Lambs on Pasture Plots at Rutherglen Experiment Farm.

wheat, and the grower of grass will not secure full value from his pasture without the liberal use of phosphates. Phosphates are of special value to grass lands. They supply an essential mineral plant food which is most likely to be lacking in ordinary soils. Any deficiency in phosphate leads to starved grass, and the stock grazing on phosphate-starved-grass cannot remain profitable to their owners.

Soluble phosphates have a most stimulating influence on the development of the young root system. It gives the wheat and the grass an early start. With wheat crops this early start does much to secure the crop against drought.

Soluble phosphates improve the feeding value of the pastures, and in grazing, stock will always prefer the manured to the unmanured

grass land. Phosphates stimulate the growth of leguminous plants, *i.e.*, clovers and trefoils, and thus enable a store of nitrogenous humus to be added to the soil. The effects of top-dressing are most marked over a very large area of Victoria. The experiments conducted by the Department of Agriculture, and by numerous Agricultural Societies under the auspices of the Chamber of Agriculture, afford most convincing evidence of the value of top-dressing as a means of greatly increasing the stock-carrying capacity of the land. Some of the results obtained in these experiments will be detailed below.

Results of Top-dressing Tests.

Rutherglen.

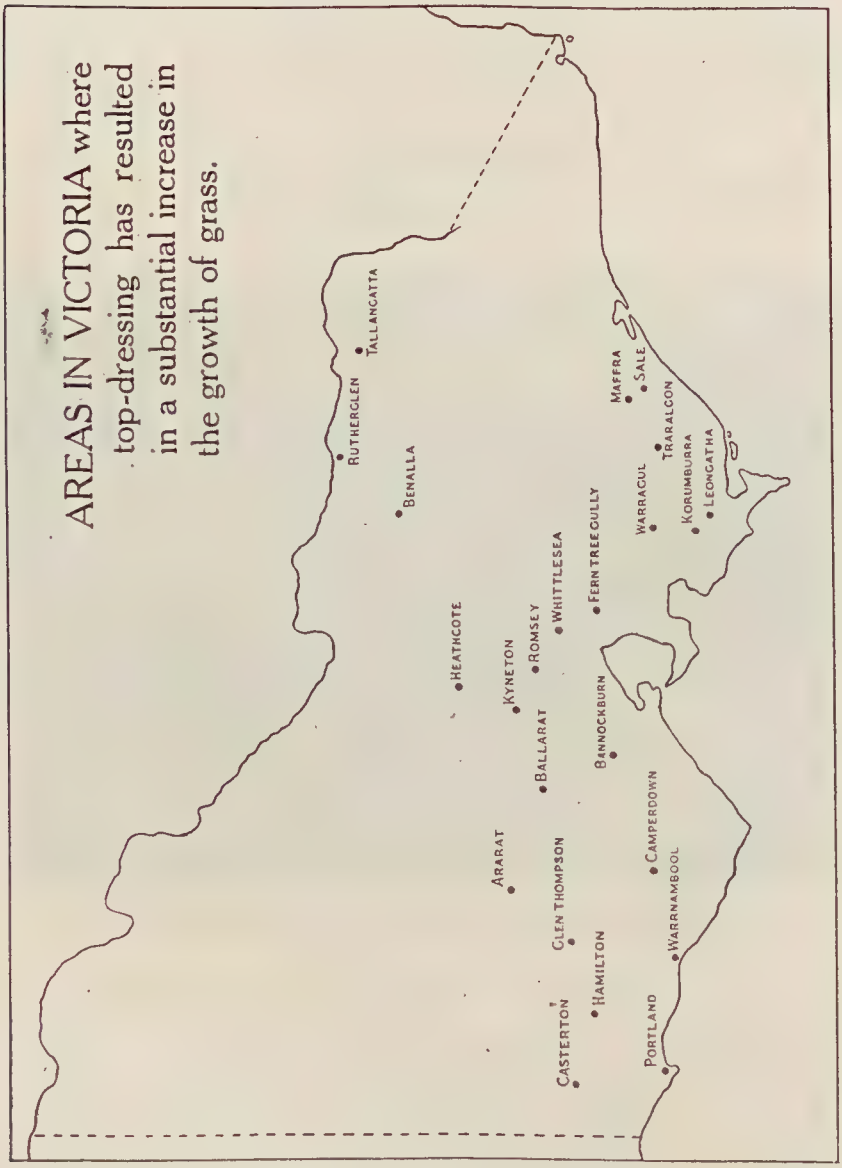
The first experiment was conducted in 1913 to determine the effect of phosphates on the grazing value of the pasture. Four plots each of half an acre in area were marked out on natural pasture land. Plot 1 received a dressing of 2 cwt. of superphosphate; Plot 2 no manure; Plot 3 Basic slag, 2 cwt.; and Plot 4, superphosphate, 2 cwt., and 10 cwt. of lime. These dressings were applied in February. The effect of the manurial applications was very noticeable to the eye, the herbage of the manurial plots being more abundant and of deeper tint than the untreated plot, and contained a much higher proportion of trefoils. In order to test the grazing and fattening value of the grass the same number of uniform quality lambs were placed on each plot on 14th November. Sixty lambs were used in the experiment, each group of fifteen lambs being weighed on and weighed off the plots. The results were as follow:—

Table I.—Increases in Live Weight of Crossbred Lambs on Grass Lands Variously Top-dressed (Rutherglen Experiment Farm, 1913).

Plot.	Treatment.	Weight on.	Weight off.	Days on Plot.	Increase of Live Weight per Plot.	Increase of Live Weight per Acre.
		lbs.	lbs.		lbs.	lbs.
1	Superphosphate, 1 cwt. 1912; 1 cwt. 1913	960½	1,206	28	245½	491
2	No Manure	950	1,069	21	119	238
3	Thomas' Phosphate, 2 cwt. 1913 only	952½	1,146	28	193½	387
4	Superphosphate, 2 cwt. 1913; Lime, 10 cwt. 1913	943½	1,192	28	248½	497

Though the winter was relatively dry, the increase in live weight due to the application of superphosphate and superphosphate and lime, was more than double the increase from the unmanured plot.

A series of top-dressing experiments was subsequently carried on four acre plots of native pasture on the Rutherglen farm. The manures were applied in the autumn from 1915 to 1920, and each year each plot was grazed to its full capacity. During 1920 records were made of the yield of dry grass, the average composition of the herbage, and


AREAS IN VICTORIA where top-dressing has resulted in a substantial increase in the growth of grass.
RUTHERGLEN
TALLANGATTA
BENALLA
HEATHCOTE
KYNETON
ROMSEY
WHITTLESEA
FERN TREE GULLY
BALLARAT
BANNOCKBURN
ARARAT
GLEN THOMPSON
HAMILTON
CASTERTON
CAMPERDOWN
WARRNAMBOOL
PORTLAND
MAFFRA
SALE
TRARALGON
WARRAGUL
KORUMBURRA
LEONGATHA

the number of sheep grazed per acre throughout the year. The results were as follow:—

Table II.—Showing Weight of Grass Hay, Percentage of Clovers and Trefoil on Fertilized and Unmanured Natural Pastures, Rutherglen.

Plot.	Yield of Grass Hay.	Percentage of Pasture in—			Percentage of Nutrients in Herbage—			Sheep Grazed throughout Year.
		Grasses.	Clovers.	Weeds.	Nitrogen.	Phos. Acid.	Lime.	
	Cwt.	%	%	%	%	%	%	
No manure ..	23·2	64·7	14·3	21·0	1·46	·27	·60	1·08
1 cwt. super.	43·7	18·0	74·8	7·2	2·28	·59	1·47	1·94
1 cwt. super. Lime 10 cwt.	62·1	21·0	74·3	4·7	2·20	·46	1·44	2·0

The results of this test demonstrates several facts—

(1) The great increase in the bulk of herbage brought about by top-dressing with soluble phosphates. The application of 1 cwt. of superphosphate nearly doubled the yield of grass hay. The application of lime in addition increased the yield from 23.2 to 62.1 cwt. of grass hay.

(2) The most remarkable development was, however, the very large increase in the proportion of trefoils and clovers on the manured pasture. These occupied nearly 75 per cent. by weight of the total herbage.

(3) As the clovers and trefoils have a higher proportion of nitrogen and potash than grasses, it was to be expected that the average proportion of these nutrients in the composite sample of manured pasture would be higher than that of the unmanured grass.

The average phosphate content of the manured pasture was considerably higher than that of the unmanured land.

(4) The number of stock raised per acre on the top-dressed plots was nearly double that of the manured plots. The stock were much healthier on the manured pasture.

Hamilton.

During 1920 a field of natural pasture at Hamilton was top-dressed with superphosphate 2 cwt., another with superphosphate 2 cwt. and lime 10 cwt., and a plot of unfertilized grass was left as a control plot. Each year the weight of dry grass was determined on each plot, and a botanical analysis made of the pasture. The results were as follow:—

Table III.—Showing Yield of Dried Grass per Acre Following One Application of Fertilizer in 1920, Hamilton.

Plot.	1920.	1921.	1922.	1923.	Average for 4 years.
	cwt.	cwt.	cwt.	cwt.	cwt.
No manure	8·0	15·3	15·9	21·4	15·1
Super. 2 cwt.	30·4	24·6	22·6	29·5	26·2
Super. 2 cwt. and lime 10 cwt.	35·4	29·3	25·7	31·9	30·5

Percentage Yield of Dried Grass Following One Application of Fertilizer in 1920.

Plot.	1920.	1921.	1922.	1923.
	%	%	%	%
No manure	100	100	100	100
Super. 2 cwt.	380	160	142	137
Super. 2 cwt. and 10 cwt. lime ..	445	191	162	144

The results were very striking. The growth of grass was greatly stimulated during the first year of the application of the fertilizers, and the weight of dry grass per acre was nearly quadrupled, the most marked result being the plot dressed with superphosphate 2 cwt. and lime 10 cwt.

The season was dry, yet the growth of the grass on all the top-dressed plots was remarkable.

Though no fertilizers were applied since 1920, there was a considerable increase in the weight of herbage on the top-dressed plots each year, and even after four years the increase due to superphosphate, 2 cwt., was 37 per cent. greater than the unmanured plot. It is clear that the effect of the top-dressing is most noticeable the first year, but that even after four years the effect of the manure persists.

Equally striking were the results of the fertilizers on the quality of the pasture. The proportion of grasses, clovers, and weeds in the pasture has been determined for the past three years.

The results were as follow:—

Table IV.—Showing Average Percentage of Grasses, Clovers, and Weeds in Top-dressed Pastures, Hamilton, 1920-23.

——	Grasses.	Clover.	Miscellaneous Plants.
	%	%	%
Nil	78·3	5·7	16·0
2 cwt. super.	66·9	15·2	17·9
2 cwt. super. and 10 cwt. lime ..	59·8	23·5	16·7

The main difference in the three plots was the increase in the leguminous plants—clovers and trefoils—in the top-dressed sections.

The marked stimulation of the growth of clovers and trefoils by phosphatic dressings is of practical significance. These plants have a high nutritive value on account of the high ratio of digestible protein to carbohydrates as compared with that of grasses and other herbage. A high proportion of leguminous herbage in the pasture is especially desirable where dairy cows are kept, for a cow in full milk requires a pasture with a relatively narrow nutritive ratio, *i.e.*, a high proportion of digestible protein to carbohydrates. Ewes and lambs and young growing stock also thrive best on such a pasture.

Besides the increase in weight of herbage and the improvement in the quality of the herbage, there was a marked improvement in the palatability of the top-dressed sections. In all cases it was found that the stock preferred the herbage on the top-dressed sections to that on the unmanured area.

An interesting example of the preference shown by cows for top-dressed land was recorded by Mr. Horne, of Cudgee. In distributing the phosphate with the drill narrow strips were inadvertently missed. Subsequently the cattle were observed to graze down these treated sections, and at the end of the season strips of dry grass on the untreated areas were visible for a considerable distance.

Glenthompson.

During 1920 the Department of Agriculture laid out a field at Glenthompson to test the effect of top-dressing on poor native pasture land. The fertilizers were applied in 1920, but no dressings have since been applied. The results, like those at Hamilton, show the lasting effect of an initial application of phosphate.

The results for three years are as follows:—

Table V.—Showing the Yield of Dry Grass Following One Application of Fertilizer in 1920, Glenthompson.

	1920.	1921.	1922.	Average for three years
	cwt.	cwt.	cwt.	cwt.
No manure	2·55	8·9	10·07	7·17
Super 2 cwt.	7·03	14·16	19·64	13·61
Super. 2 cwt. and lime 10 cwt. ..	8·4	19·7	26·11	18·07

It is apparent that the beneficial effect of the fertilizers applied in 1920 was still pronounced three years after the application of the phosphate. One peculiarity in this series of plots was the absence of trefoils and clovers on all plots. In all other experiments conducted by the Department and by the Chamber of Agriculture, the increase in the development of the leguminous herbage was a marked feature resulting from the phosphatic dressing. It is probable that on the poor pasture lands of this district, the seeding of trefoils and clover with the application of the fertilizers would prove beneficial. This matter is being tested this season.

(To be continued.)

NHILL CROP AND FALLOW COMPETITIONS, 1923.

Report of the Judge, H. A. Mullett, B.Ag.Sc., Senior Inspector of Agriculture.

The Nhill Agricultural Society has for many years past rendered conspicuous service to the local community by fostering the spread of advanced farming methods. Some twenty-four years ago it inaugurated the now popular crop and fallow competitions, a lead since followed by nearly every progressive Agricultural Society throughout the wheat belt of Australia. To supplement this work, the Society arranged for and warmly supports a series of experimental field plots conducted by the Department of Agriculture. By this means the exact truth in several aspects of local wheat production is being ascertained.

The competitions attract from fifty to eighty entries annually, while the number of persons who attend the annual gathering at the experimental plots at Salisbury has now reached over 200—all evidence of the interest in agricultural matters that the society arouses. As a further example of the progressive and inquiring spirit that pervades the district, the Turner Cup Competition can be cited. Mr. Turner, a local citizen, has presented twenty guineas for a trophy for competition. Competitors are required to conduct approved field experiments themselves in methods of cultivation of wheat. For three years crops grown on summer fallow will be compared with those grown alongside on winter fallow. The rules provide for the sowing of carefully prepared areas of both types of fallow under controlled conditions, and for the weighing of the produce. By this means the society hopes to collect a mass of exact data in relation to the two methods of fallowing, a matter of great practical importance. By a combination of unfortunate circumstances the commencement of the competition was deferred to 1924, but three competitors, who had each prepared their two plots of 10 acres, decided to carry on on a non-competitive basis. Thus they have demonstrated that they are actuated by the highest motives—pursuit of knowledge for its own sake.

The Competition 1923.

The season was notably dry in the autumn, and many forecasted a drought. The rains were delayed until well on in May, but continued through June and July with a persistence which was the despair of every farmer in the district. In Nhill there is little land which can be sown as late as is done on the Horsham plains. The contour of the country is fairly undulating. The rising land is usually a stiff red clay or sandy soil over clay, and the flats between the rises are of black soil, of a texture suitable for June and July sowing, but in seasons like the present, flood waters may cause serious interruptions to any one drilling so late.

Those who had not seeded the red land before the rains came—and few at Nhill now care to sow wheat dry—later found that it was next to impossible to drill under satisfactory conditions. The crop had to be pugged in, and in some paddocks was not sown at all; hence wheat on the red land this year was thin, and yields were light except

where the grain was sown in time. The red land at Nhill is of a particularly refractory nature, and for that reason local farmers have watched with great interest the results of the experiments with gypsum which the Department is carrying out on very stiff red clay soils on the farm of Mr. W. E. Dahlenburg, at Salisbury. The wheat was sown late in June, in anything but favorable conditions. Naturally the germination was very poor. The yield on the half acre treated with superphosphate alone was 9.2 bushels per acre. Where gypsum (1 ton per acre) was also applied a half acre yielded at the rate of 13.9 bushels per acre. The latter crop was noticeably thicker and taller, and later in maturing, while the surface of the soil was rendered more or less crumbly, even though the gypsum had a relatively short time in which to change the texture of the soil. This year the gypsum was placed on the fallow in October, so that it has a much longer time to exert its full effect. While the yields on this preliminary experiment are low, nevertheless it is certain that under more favorable conditions much better results will be obtained; hence the interest with which farmers viewed these experiments on the field day.

Judging the Yields of the Plots—Field Day, Salisbury.

Crops on the black flats were wonderfully good, though a few acres here and there had been drowned out. In one or two instances slight damage had been caused by a late frost which, strangely enough, occurred on the same date as did the one responsible for such wholesale damage a year previously. On this class of soil yields close up to 50 bushels per acre were obtained in some paddocks. The crops were surprisingly free from weeds, though there seemed more foreign heads than in former years. As usual, the crops promising the heaviest yields had had most skill bestowed on them in the matter of well prepared fallow, the use of selected seed of prolific varieties, and liberal dressings of fertilizer. There was little evidence of any disease except on Mallee soils, where flag smut, take-all, and bunt had in one or two instances taken considerable toll of the crop.

The two new sections of the competition, viz., No. 9 and No. 1, enabled a number of new wheats to be seen under field conditions on varying soils. Wannon appeared to be the most consistent of the lot. Hard Federation and Minister were the two varieties specified in section 9. Crops of each were inspected, but few appeared to be quite as heavy as standard Federation, Wannon, or Gallipoli. Wild oats

appeared thicker in Minister than in most other crops—apparently due to the slow straggling habit of growth of Minister in the early stages. Other crops of it on the black soil indicated a rather weak straw.

Results.

Wheat Crops.

The principal section for wheat crops (1a) is for the best half of a farmer's crop—at least 75 acres. Mr. Robert Blackwood, a consistent prize winner, was awarded 96 out of a possible 100 points for an excellent exhibit of four varieties—Wannon, Huff's, Gallipoli, and Hard Federation.. Mr. Alfred Schultz was second with 92 points. Wannon, Federation, Minister, and Hard Federation being shown in this instance. Mr. W. E. Dahlenburg, 91 points, was third, with a fine paddock of Wannon. The first three crops would be hard to beat anywhere. They were comparatively short-strawed, dense, well-headed,

Portion of the Gathering at the Experimental Plots, Salisbury, on Farmers' Field Day.

level, and practically free from any weeds and undergrowth whatever. Mr. Blackwood's appeared to be the densest and the most regularly headed of the three. All were reasonably free from foreign heads, but that of Mr. A. Schultz was the best in this respect. The first and second prize crops were grown on summer fallow, and the third was on winter fallow.

Mr. Blackwood's paddock is a rich black flat. It was ploughed towards the end of March and early in April to 4 inches deep, and then harrowed immediately. At the end of July weeds were scarified out. Subsequently the spring-toothed cultivator was used to work up the paddock in mid-August; again late in September, and again in mid-November. A fortnight after the first autumn rain in May, and after the rubbish had germinated, the paddock was spring-toothed up. The crop was sown in June, at the rate of 72 lbs. of graded seed, with 1 cwt. of 22 per cent. superphosphate, then harrowed. The rotation system under which the paddock is being farmed is: fallow, wheat,

oats, fallow, wheat, grass. The total area of wheat sown by Mr. Blackwood was 325 acres, of which 162 acres were submitted to the judge in this section.

The wheat entered by Mr. Schultz was also grown on well-worked summer fallow. No fewer than two cuts with the scarifier and one with the combined drill, and a harrowing, were given in the spring; then followed a further harrowing during harvest time to conserve moisture deposited by a thunder storm. About a fortnight after the first rains in the autumn, when there was a good germination of rubbish, the paddock was spring-toothed up, and early in June sown with 75 lbs. seed per acre and 94 lbs. superphosphate. Each of the first three competitors included Wannon in their exhibit. It appeared to be substantially the most prolific of the several varieties seen.

Portion of the Plots Conducted at the Farm of Mr. W. E. Dahlenbury, Salisbury.

Details of Award.—Section 1a: For Best Half of Farmer's Wheat Crop.

(Not less than 75 acres.)

Competitor.	Variety.	Yield.	Trueness to Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible Points ..	..	35	20	15	15	15	100
R. Blackwood ..	Wannon, Huff's, Gallipoli, Hard Federation,	35	17	14	15	15	96
A, Schultz ..	Federation, Wannon, Minister, Hard Federation	34	18	12	14	14	92
W. E. Dahlenburg ..	Wannon ..	33	17	13	14	14	91
H. Koop ..	Federation ..	30	18	14	14	14	90
C. F. H. Reichelt ..	Federation ..	32	17	13	13	12	87
E. G. Hoffman ..	Federation ..	25	19	12	12	11	79

Section No. 1.—For Best Three Varieties of Wheat. Not less than 15 acres.

In this section the leading competitors showed portions of crops similar to those entered in section 1A.

Mr. R. Blackwood was first, with 96 points; Mr. Alfred Schultz second, with 89 points. Mr. Reichelt's Federation was a magnificent crop; but the Dollar and Huff's were sown on Mallee land which had been somewhat water-logged. Messrs J. and T. W. Rintoule's Federation was good, but the yields of the other two varieties, sown under somewhat unfavorable conditions, were much lower. The winner's methods have been already described.

DETAILS OF AWARD.—SECTION NO. 1: BEST THREE VARIETIES OF WHEAT.

(Not less than 15 acres.)

Competitor.	Variety.	Yield.	True-ness to type.	Absence of Weeds.	Absence of Disease.	Even-ness.	Total.
Possible Points ..	.. .. ..	35	20	15	15	15	100
R. Blackwood ..	Gallipoli, Huff's, Wannon	35	17	14	15	15	96
A. Schultz ..	Federation, Hard Federation, Minister	31	18	13	14	13	89
C. F. H. Reichelt ..	Federation, Dollar, Huff's	20	17	14	15	12	78
J. & T. W. Rintoule	Federation, Hard Federation, Minister	20	16	11	12	10	69

Section 2.—For Best Mallee Crop of 100 Acres.

Three of the four competitors in this section showed crops of apparently equal yield, but which in other factors differed greatly. Mr. J. B. Marshall's crop of Federation was the most true to type, but take-all and black rust had reduced the yield. The winner was Mr. E. J. Dart, a returned soldier, who exhibited a good, though somewhat uneven, crop of Federation and Minister. Portion on grey soil at the lower end of the field was very heavy, but higher up the crop was lighter. It was true to type and comparatively free from foreign heads.

Mr. Dart had worked the fallow on which this crop was grown most thoroughly, as follows:—Ploughed in July and August to 3 inches deep, then harrowed; scarified in September and October; then part worked over with cultivator drill where wild oats sowed, and harrowed in November. Before seeding, 50 acres of the grey soil were worked over with the combined cultivator drill, and the rest was given a stroke with the harrows. The seeding took place during May and June, with the combined drill, 70 lbs. of seed per acre being used with 83 lbs. of superphosphate.

Mr. C. F. H. Reichelt showed Huff's and Dollar. The land was subject to some water-logging, and in parts the crop was patchy. The paddock was ploughed in June to 3 inches deep, then harrowed twice. In the spring two strokes of the spring-toothed cultivator were given. After harvest some stinkwort was cut out with the spring-tooth cultivator. Finally the wheat was sown in May with the combined drill, with 75 lbs. seed per acre and 90 lbs. of 22 per cent. superphosphate.

Heavy Crop of Wannon Wheat—Mr. W. Dahlenburg's, Salisbury.

Details of Award.—Section 2: For Best Mallee Crop of 100 Acres.

Competitor.	Variety.	Yield.	Trueness to Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible Points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**
F. J. Dart ..	Minister, Federation	26	18	11	10	12	77
C. F. H. Reichelt ..	Federation, Huff's	26	17	11	12	10	76
J. B. Marshall ..	Imperial, Dollar Federation ..	20	19	14	9	13	75
D. R. McKenzie ..	Federation, Dollar	26	17	9	7	13	72

Section 5.—Highest Aggregate for Fallow, 1922; Crop on the Fallow, 1923.

This competition was commenced in 1922, when the fallows were inspected and points awarded. Mr. Blackwood, who secured 98 points for his fallow, and 94 for his crop this year, totalling 192 points, was first. His method of wheat growing has been already described. Mr. C. F. H. Reichelt was second with a magnificent crop of Federation, grown on summer fallow on a black flat on the fringe of the Mallee. The yield should be close to 50 bushels to the acre. The previous crop was wheat. The stubbles were burnt as late as possible, and then the paddock was worked over with a spring-toothed cultivator, for the

purpose of incorporating the ashes before dispersal by wind. In July weeds were destroyed with the cultivator drill. The spring working consisted of two harrowings in September, a scarifying and a cultivator-drill working in October. Following on the first rains in May the paddock was harrowed and sown with the combined drill during the first fortnight in June, and then harrowed; 75 lbs. of pickled seed were drilled on each acre, with 90 lbs. of 22 per cent. superphosphate. This is equivalent to about 110 lbs. of ordinary superphosphate. It will thus be seen that the crop was raised without the fallow having been touched by a plough

DETAILS OF AWARD.—SECTION No. 5.

Highest Aggregate Fallow, 1922; Crop on the Fallow, 1923.

Competitor.	Yield.	Trueness to Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Total for Crop, 1923.	Total for Fallow, 1920.	Grand Total.
Possible points ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
R. Blackwood ..	33	17	14	15	15	94	98	192
C. F. H. Reichelt	35	18	13	14	15	95	95	190
Alfred Schultz ..	30	18	12	14	13	87	94	181
W. E. Dahlenburg	22	20	12	15	11	80	95	175
Dufty & Garton Peter Bone .. J. & T. W. Rintoule Bryan Dufty ..	Withdrawn.							

Section 7.

In this section the competition lasts two years. The object is to gain information about the methods of growing wheat on stiff red soils. The fallows were judged in 1922, and the wheat crop grown on them in 1923.

Mr. C. F. H. Reichelt was first, with 167 points, and Mr. C. P. Dahlenburg second with 152. The paddock submitted by the latter, however, was the more refractory of the two, and the crop suffered severely from the wet.

Mr. Reichelt's paddock received the following treatment:—The land was ploughed in July to 3 inches deep, then harrowed twice. Subsequently two strokes with the spring-tooth were given in the spring. In the autumn a further spring-toothing was given before the crop was sown with a combined drill at the end of May, and harrowed. Seventy-five pounds of Federation wheat were used, with 90 lbs. of 22 per cent superphosphate.

DETAILS OF AWARD,—SECTION No. 7.

Highest Aggregate Fallow (Stiff Red Land), 1922; Crop on Fallow, 1923.

Competitor.	Yield.	Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Total Crop, 1923.	Total Fallow, 1922.	Grand Total.
Possible Points ..	**35**	**20**	**15**	**15**	**15**	**200**	**100**	**200**
C. F. H. Reichelt	26	17	11	12	10	76	91	167
C. P. Dahlenburg	12	18	9	11	9	59	93	152

Section 9.

In order to promote interest in the production of high strength grain, Messrs. Noske Bros., flour millers, offered a prize for competition over two years. It was stipulated that competitors were to prepare 50 acres of fallow for the judge, and that it was to be sown half with Minister wheat and half with Hard Federation.

The first prize was awarded to Mr. Alfred Schultz for an excellent paddock of the two varieties. The yield was heavy, and the wheat reasonably true to type. A few weeds were showing in the Minister. There was almost a complete absence of disease. Mr. Schultz's method of growing the crop has been described, as also those of Mr. R. Blackwood (second) and Mr. G. Batson, junior (third).

Heavy Mallee Crop—Mr. E. J. Dart's, Tarranginnie.

Details of Award.—Section 9 (Noske Bros. Pty. Ltd. Trophy).

Highest Aggregate for 50 Acres Fallow, 1922; Wheat on the Fallow, 1923.

(Provided that the Wheat comprised 25 Acres Minister and 25 Acres Hard Federation.)

Competitor.	Variety.	Yield.	Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Crop, 1923.	Total for Fallow, 1922	Grand Total.
Possible Points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
Alf. Schultz	Hard Federation, Minister	35	18	12	14	13	92	98	190
R. Blackwood ..	,, ..	34	16	11	15	13	89	100	189
G. Batson, junr. ..	,, ..	31	15	10	12	13	81	96	177

Section 6.

The competition extends over three years. The whole of the crop and fallow is judged. The competition is thus a very severe test of good farming.

Mr. R. Blackwood was first, with 361 points out of 400. Full points were secured this year for yield—that is, the average yield was estimated at more than 35 bushels per acre. The method by which the principal portion of this crop was raised has already been described.

Mr. W. E. Dahlenburg was second, with 354 points; and Mr. C. F. H. Reichelt third with 346. The consistent performance of the first two competitors, in view of the varying nature of the soil on their farms, is most commendable. Mr. Dahlenburg had two main paddocks —one 110 acres, principally Federation grown on summer fallow, and 80 acres of Wannon on winter fallow. Portions of the summer fallow

Crop of Federation Wheat at Mr. E. G. Hoffman's.

had been seriously water-logged, otherwise the yield was satisfactory. The whole of the seed used on Mr. Dahlenburg's farm was dervied from the Government experimental plots located on his property. The Wannon on the winter fallow was the heavier crop, 40 acres yielding in the vicinity of 48 bushels per acre. The paddock—which had been out in grass for several years—was ploughed early in August and then harrowed twice. In September weeds were scarified out, and then two strokes of the harrows were given. Examined at the end of November the under layers appeared to be somewhat unconsolidated, but probably the heavy rains that fell the following winter were sufficient to pack the soil properly. The wheat was sown in June at the rate of 74-75 lbs. per acre, together with 112 lbs superphosphate; then two harrowings were given.

The treatment given Mr. Reichelt's crop has already been described.

Owing to the heavy frost experienced in 1922 a number of competitors were forced to withdraw.

Details of Award.—Section 6.

Highest Aggregate for whole of Fallow, 1921; for Whole of Crop, 1922; for Whole of Fallow, 1922; for Whole of Crop, 1923.

Competitor.	Yield.	Type.	Absence of Weeds.	Absence of Disease.	Even-ness.	Total Crop, 1923.	Fallow.	Crop.	Fallow.	Grand Total.
Possible points ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**100**	**100**	**100**
R. Blackwood ..	35	16	10	14	13	88	95	82	96	361
W. E. Dahlenburg	30	18	11	14	12	85	96	80	93	354
C. F. H. Reichelt	24	16	12	13	10	75	95	86	90	346
Peter Bone ..	Withdrawn (Frosted crop, 1922).									
C. P. Dahlenburg										
H. E. Dahlenburg										
H. W. Goodwin										
J. Reichelt ..										
O. H. Reinert ..										

Section 8.

This competition is similar to No. 6. The whole of the crop and fallow are shown for a period of years. A commencement was made last year. So far Mr. R. Blackwood is first, with 276 points; and Mr. W. Dahlenburg second, with 271.

Details of Award.—Section 8.

Highest Aggregate for Whole of Fallow, 1922; for Whole of Wheat Crop, 1923; for Whole of Fallow, 1923; for Whole of Wheat Crop, 1924.

Competitor.	Fallow, 1922.	Wheat, 1923.	Fallow, 1923.	Grand Total.
R. Blackwood	96	88	92	276
W. Dahlenburg	93	85	93	271
Alf. Schultz	91	84	87	262
H. E. Dahlenburg	93	88	80	261

Fallows.—Section 3.—For Best Fallowed Black Land. Not less than 100 Acres.

Competition in this section was exceedingly keen. The fallows were all so well prepared that there was the greatest difficulty in separating them. Mr. R. Blackwood was awarded first prize and 98 points for an almost perfect fallow. The tilth of the land resembled that of a well-worked garden. The dust mulch had the characteristic mellow appearance that the black soil takes when it is cultivated while still in a moist condition. This was superimposed on a hard layer as level as if

it had been pared with a plane—a condition which indicates the care with which the depth levers on the various implements had been maintained.

Mr. C. P. Dahlenburg and Mr. E. G. Hoffman were each awarded 97 points, Mr. W. E. Dahlenburg 96, then follow Mr. Alf. Schultz and Mr. W. O. Uthmeyer. Even the unplaced fallows, such was their condition, would have gone near to winning a competition in almost any other district. The best paddock shown by Mr. Blackwood was 130 acres of summer fallow. This had been scarified at the end of March out of oat stubble. Harrowing followed immediately. In mid-July the weeds were scarified out, then three strokes with the spring-tooth were given in the spring, viz.: September, first week, October, first week and again third week. The paddock was harrowed again in November.

Friesian Cow—Mr. A. Dahlenburg's, Winiam.

Mr. C. P. Dahlenburg's fallow was, in the main, summer fallowed. It was ploughed in March, scarified early in September, harrowed a fortnight later, then worked over with a combined spring-tooth drill early in October, again in early November, and harrowed.

Mr. E. G. Hoffman's exhibit was also mainly summer fallow. It was ploughed in April, then harrowed; in early April a stroke of the scarifier was given, and then the harrows. In October the paddock was scarified and harrowed twice.

The entry of Mr. W. O. Uthmeyer was also excellent in many respects. The rules provide that while the principal attention is to be confined to 100 acres of fallow, an inspection is to be made of the whole. The position is now arising that the best fallows are so good that to separate competitiors reference must be made to the balance of the fallow.

Details of Award—Section 3.

For best Fallowed Black Land—not less than 100 acres.

Competitor.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Possible Points	**25**	**25**	**25**	**25**	**100**
R. Blackwood	23	25	25	25	98
C. P. Dahlenburg	25	25	24	23	97
E. G. Hoffman	25	24	25	23	97
W. E. Dahlenburg	25	24	25	22	96
Alf. Schultz	25	23	23	24	95
W. O. Uthmeyer	23	24	22	25	94
J. & T. W. Rintoule	23	22	23	23	91
C. F. H. Reichelt	23	21	23	23	90

Section 11.

In this competition the whole of the fallow and the crop are judged for a period of several years, commencing with the fallow 1923. Mr. E. G. Hoffman's fallow, which includes the fallow shown in section 3, was placed first.

Each paddock of fallow was uniformly good. The treatment of the summer fallow has been described. The winter fallow was ploughed in July, harrowed twice, then cultivated with a combined drill at the end of September and harrowed. The whole of Mr. W. E. Dahlenburg's fallow was also of a high standard. The summer fallow was ploughed in March, spring-toothed with a rigid-tined cultivator in July, and in August harrowed. The rigid-tined cultivator was used again in mid-October, followed by the harrows in September.

Details of Award—Section 11.

Highest Aggregate for Whole of Fallow, 1923; Highest Aggregate for Whole of Crop, 1924; Highest Aggregate for Whole of Fallow, 1924; Highest Aggregate for Whole of Crop, 1925.

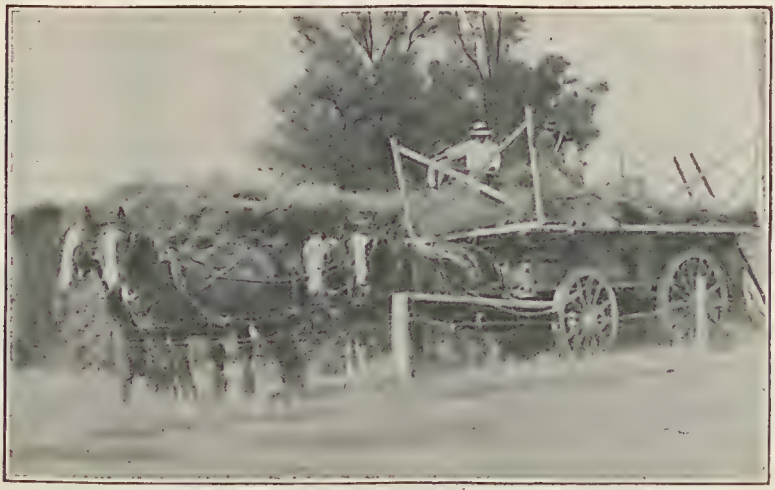
Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total.
Possible Points	**25**	**25**	**25**	**25**	**100**
E. G. Hoffman	25	23	25	21	94
W. E. Dahlenburg	24	23	25	21	93
R. Blackwood	22	23	24	23	92
Alf. Schultz	24	20	22	21	87
C. F. H. Reichelt	23	19	21	19	82

Section 10.—Highest Aggregate for Fallow, 1923; Crop on the Fallow, 1924. Not less than 100 Acres.

The competition commenced this year with the fallow, and extends to next year, when the wheat crop grown on the fallow will be judged. The awards, so far, are similar to those given under section 3.

Details of Award—Section 10.

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total.
Maximum points	**25**	**25**	**25**	**25**	**100**
R. Blackwood	23	25	25	25	98
C. P. Dahlenburg ..	25	25	24	23	97
E. G. Hoffman	25	24	25	23	97
W. E. Dahlenburg ..	25	24	25	22	96
Alf. Schultz	25	23	23	24	95
C. F. H. Reichelt ..	23	21	23	23	90



Stacking Hay at the farm of Mr. A. Dahlenburg, Winiam.

Section 4.—For Best Red Fallowed Land. Not less than 100 Acres.

The object of this competition is to endeavour to discover better methods of cultivating the stiff red clays. Hitherto the conditions stipulated that the soil must be of a refractory nature, but this year that provision was omitted. Consequently, soil of varying sorts was submitted, but the competition diminishes in educational value. Mr. V. Collins was first with 96 points, and Messrs. B. Dufty and J. W. Dodd's entry was second with 91. The winning fallow was in excellent condition; the moisture content of the sub-soil was high, the mulch of adequate depth (2½ inches), if somewhat too cloddy—a good fault on stiff red land—weeds were absent, and the cultivation had been thorough. The paddock was ploughed in July and August to 4 inches deep, then harrowed; subsequently it was scarified in mid-September and spring-toothed in mid-October.

The second prize fallow was excellent in all respects, save that the moisture-protecting mulch was somewhat thin. A fallow so constructed tends to crack, and the loss of moisture may be considerable during a long dry summer. The reason why the mulch was so shallow was because the spring-tooth cultivator was relied upon for the whole of the

heavy work other than, of course, the original ploughing in July. The early spring working was too shallow, and hence could not be afterwards deepened.

Details of Award—Section 4.

For best Red Fallowed Land—not less than 100 acres.

Name.	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total.
Possible points	**25**	**25**	**25**	**25**	**100**
V. Collins	24	23	25	24	96
B. Dufty & J. W. Dodd ..	24	21	23	23	91
C. F. H. Reichelt ..	25	20	22	19	86

Experimental Plot Competition.

A Preliminary to the Turner Cup.

Though the Society decided to defer the commencement of the Turner Cup competition, three farmers, who had intended competing, decided to conduct a friendly contest between themselves. Each prepared 10 acres of winter fallow and a corresponding area of summer fallow alongside, and submitted them to the judge.

Points were awarded in accordance with the scale proposed for the Turner Cup, and set out below. Mr. W. E. Dahlenburg was first with 194 points out of 200, Mr. R. Blackwood second with 188, and Mr. C. P. Dahlenburg third with 187 points.

Competitors chose 20 acres of as even a soil as possible. Points were allotted for this, for the lay-out of the plots, for regular cultivation, for the system of cultivation followed, and for the condition of the fallow at the time of judging. Next year the area will be sown uniformly with wheat, and the crops judged and subsequently weighed over the local weighbridge. All of these fallows were in perfect order, and the experiment is being accurately conducted. Results of the greatest interest may, therefore, be looked for However, because the autumn of last year was so dry, summer fallow may have little advantage over the winter fallow.

Details of Award—Experimental Plot Competition.

Summer Fallow *versus* Winter Fallow.

Name.	Evenness of Soil.	Layout of Plots.	Regular Cultivation.	System of Cultivation.	Condition of Fallows.	Total.
Possible points}.. ..	**30**	**15**	**15**	**40**	**100**	**200**
W. E. Dahlenburg ..	28	15	15	39	97	194
R. Blackwood ..	25	13	14	39	97	188
C. P. Dahlenburg ..	27	11	12	38	99	187

Pickling Wheat.

On all soils but the black, poor germination was the rule this year. Even on these there was an undue loss of seedlings. A thinly-sown crop generally stools better than a thick one, but rarely is this sufficient to make up for loss of seed killed out. For good germination, warmth, air and moisture are required in nicely adjusted proportions. Excess of water reduces the air supply. Dull, bleak, drizzly days extending for weeks at seeding time result in low soil temperatures, and hence slow germination and growth. The longer the plant remains in the tender sprouting and seedling stage the greater its liability to meet with disaster from attacks of mould, fungi and other enemies of plants. When wheat has to be sown under such conditions at all costs, efforts should be made to assist the plant through the danger period. The usual dressing of phosphate should be substantially increased. This helps to force the young plant along. A striking illustration of the advantage of heavy dressings of superphosphate in this respect occurred on the experimental plots at Shepparton last year. Immediately on sowing the crop a heavy downpour occurred, and rain continued off and on for weeks. All

Pise house in course of erection at Mr. P. Koop's, Nhill.

plots were more or less waterlogged, but the one treated with superphosphate, 2 cwt., had a far more even germination than any other, and the crop grew on wet patches in this plot, while in similar situations on unmanured soil alongside, the seed failed. The results were as follows:—Super., 2 cwt. 31.8 bush. per acre; no manure, 24.8 bush., super. ½ cwt. 21.3 bush., super. 1 cwt. 26.0 bush.

It is not well known that the ordinary process of pickling has a depressing effect on the germination of the grain, leading to losses of up to 25 per cent. But there are a few shrewd farmers who, when faced with sowing under extremely bad germinating conditions, refrain from pickling their seed. They find that the young plants come through the soil several days ahead of the pickled seed, and that the young crop is more vigorous. Thus, they prefer to run the risk of a bunted crop in order to assist the plants through their most critical stage. But, obviously, if this practice be extended to large areas of crop, severe

attacks of smut sooner or later are inevitable, hence the need for a pickling process which does not depress the germination of the seed. Fortunately such a one has been recently invented by an Australian, Dr. Darnell Smith. During the past four years it has been carefully tested, both in Australia and in America, and in America it has been adopted on a wholesale scale.

For pickling, the copper carbonate is mixed with the wheat at the rate of 2 ounces per bushel. The wheat and the powder must be intimately mixed by mechanical means. The main reason why Australian farmers have been slow to use the new process is because of the comparatively high cost of the powder here. To treat each bushel costs 4d. for the chemical.*

But 2 ounces per bushel is not necessarily the minimum quantity for effective pickling; nor is copper carbonate the only fungicide which will give the same result. Tests are now being made by the Department of Agriculture to determine the lowest amount of the powder, diluted and undiluted, that is necessary; also whether bluestone, a much cheaper substance, powdered either by grinding or partial dehydration, is effective. By this means it is hoped that the cost will be reduced. But even at 4d. per bushel there are many who will prefer to use the new process, especially on land and under circumstances where germination troubles are experienced.

* * * * * * * *

In conclusion I desire to thank those members of the society whose hospitality contributed much towards rendering the work of judging less arduous, and especially Mr. Chas. Towns, the secretary, for his help and consideration.

* Since the above was written the cost of copper carbonate has been reduced a hundred per cent.

EXPERIMENTS IN THE CLEANSING OF FRUIT CASES.

Trials were carried out at Bathurst (New South Wales) Experiment Farm recently to ascertain how long a fruit case must be immersed in boiling water to kill codlin grubs in cocoons. It was found that when the grubs were located in the joints of the cases a mere dipping in and out was not sufficient. To kill them all an immersion of three minutes was required.

Up to four times the ordinary fumigating strength of cyanide proved insufficient to kill codlin moth grubs in the cocoons and in bandages.—*Agricultural Gazette of New South Wales*, January, 1924.

TREATMENT OF WHEAT FOR SMUT.

Use of Powdered Copper Carbonate and Powdered Copper Sulphate for Control of Smut.

By A. E. V. Richardson, M.A., D.Sc., Agricultural Superintendent.

The use of fungicides for the control of smut or bunt (*Tilletia tritici*) in wheat has long been a part of the farm routine at seed-time. Bluestone (copper sulphate) and formalin (formaldehyde-gas dissolved in water) have been extensively employed for controlling this disease.

The methods hitherto adopted have been to use solutions of these fungicides of definite strength and to immerse the seed in the antiseptic solution for a given length of time.

The object of the treatment is achieved by the use of an antiseptic solution strong enough to kill all spores of smut adhering to the seed, without materially affecting the vitality of the wheat seed.

If the solutions used are too weak the smut spores will not be killed. If the solutions are too strong the germ of the wheat will be injured, and in such a case the germination of the grain will be considerably lowered and the growth of the young seedling retarded.

It is found in practice that solutions sufficiently strong to kill all spores of smut invariably have an injurious effect on the vitality of the seed. This is reflected in a poorer germination of the pickled seed, and in slow growth of such seeds as are unaffected by the antiseptic solutions. Hence we find under field conditions that seed pickled with solutions of bluestone and formalin usually show a poorer germination and delayed germination compared with untreated seed.

The extent to which the germination is affected by the fungicidal solutions depends on the strength of solution, the time of immersion, the moisture content of the soil at the time of seeding, and the time which elapses between the pickling of the seed and the sowing of the seed.

The normal strength of these solutions used in Victoria is:—Formalin—1 part of formalin mixed with 450 parts of water (1 lb. formalin to 45 gallons of water—and bluestone, 1½ per cent. (1½ lbs. dissolved in 10 gallons of water). The period of immersion of the seed is usually three minutes.

Experience and experimental trials have demonstrated that fungicidal solutions of these concentrations are strong enough to kill smut spores on the grain without unduly lowering the vitality of the seed. Provided the seed is sown on moist soil immediately after pickling the results are fairly satisfactory. If, however, there should be any considerable delay between the pickling and the sowing of the seed, there may be a substantial falling off in the percentage of seeds that germinate. Moreover, if seed pickled by either of these methods is sown in a dry seed bed, the effect of the fungicidal solutions on the vitality of the seed becomes very pronounced.

Both these fungicides are completely effective in destroying smut spores adhering to the seed. But they differ very much in their power to prevent reinfection. Bluestone not only kills smut spores on the

seed, but also protects the seed against reinfection. Formalin, however, has little power to prevent reinfection. Reinfection often occurs, particularly where smutted wheat is treated in closed sacks.

Smut may occur in seed in two forms—

(1) In loose spores adhering to the brush and in the crease of the grain, or (2) in the form of bunt balls.

Pickling in sacks kills all loose spores adhering to the grain. The time during which the seed is immersed in the pickle is insufficient for the complete penetration by the antiseptic solution of the more or less impermeable walls of the bunt ball, and for the complete wetting of the mass of spores enclosed in the bunt ball.

Consequently when such a sample of seed is sown the brittle case of the smut ball may break during the passage of the seed through the force feed attachment of the drill and a mass of smut spores is showered over the seeds. Reinfection of the grain is therefore very likely to occur when a smutty sample of wheat is pickled in a sack.

Hence in many pickling machines—*e.g.* Bishop's, McCabe's—provision is made for running the seed in a stream into the antiseptic solution. By this means the light bunt balls separate from the mass of wheat, float on the surface of the pickling solution and are skimmed off. In this way even a badly smutted sample of grain may be made reasonably safe from reinfection.

Bluestone solutions afford considerable protection to the grain from reinfection. Formalin, however, is much less effective, mainly for the reason that it is a solution of gas in water, and that as the grain dries its fungicidal properties gradually disappear. The depressing effect of bluestone and formalin on the germination of the seed, and the delay in the germination which frequently arises when these antiseptics are used, make the use of these solutions somewhat objectionable. A more serious objection arises from the fact that the seed must be sown immediately, otherwise considerable losses may result from lessened vitality of the seed. When therefore these solutions are used, pickling must not proceed far ahead of the actual seeding requirements. Hence much valuable time is lost during the busy seeding period—time which can be ill-spared on account of the shortness of the days when winter wheat is being seeded.

If we could obtain at a reasonable cost a fungicide that would (1) kill smut spores without injury to the seed, (2) prevent reinfection of the seed, and that could be used some weeks ahead of seeding without lowering the germination and vigor of the grain, then we would have an almost ideal antiseptic for smut control.

Such a fungicide appears to be in sight. The use of finely-powdered copper carbonate for smut control was first suggested by the researches of an Australian biologist—Dr. Darnell Smith, of the New South Wales Department of Agriculture.

Darnell Smith experimented with heavily infected seed at Wagga and Cowra Experiment Farms, and came to the conclusion that copper carbonate dust applied to seed at the rate of 2 ozs. per bushel would give better results for smut control than the use of standard methods.

The copper carbonate dust does not cause material injury to the grain, it does not lower the vitality of the grain, and even if seed is treated some considerable time prior to sowing, no injurious effects are observed either on germination or the early growth of the crop. This permits the treatment of the seed during the slack season preceding the seeding and so saves much valuable time during the busy sowing season.

As the germination is neither affected nor delayed by the use of these dry treatments, it follows that the young crop should germinate evenly and grow rapidly in the early stages. This results in a good vigorous stand of wheat which is invariably reflected in increased crop yields.

There are two rather serious drawbacks to the use of this method —(1) the cost of the material, (2) the irritation caused by the copper carbonate dust.

Copper carbonate is much more expensive than bluestone, because it contains more than double the amount of copper. The saving in the cost of labour and the very superior results arising from the use of copper carbonate more than offset this disadvantage.

Considerable irritation may result if the fine dust is inhaled during the process of pickling, but this may be avoided by the operator wearing a dust mask similar to that used by workers in chemical factories where chemical dusts are manufactured, or by tying a wet handkerchief over the nose and mouth during the process of treatment.

Experiments Conducted by the Department of Agriculture.

The Department of Agriculture of Victoria has conducted experiments for the past four years to compare the standard method of pickling with the new method of dry pickling with copper carbonate.

The experiments were begun in 1920. When they were commenced copper carbonate was unobtainable in commercial quantities. It was obtainable in chemically pure form only at a price that would be prohibitive for field work. Tests were therefore made to determine whether finely-powdered bluestone (copper sulphate) would behave in the same way as copper carbonate.

The sample of Federation seed was heavily and uniformly infected with bunt spores collected from bunt balls of the previous harvest. The treatments given were as follows:—

(1) Soaked in water for 3 minutes.
(2) Immersed in solution of bluestone 2 per cent. for 3 minutes.
(3) Immersed in solution of formalin 1 in 400 for 3 minutes.
(4) Treated with powdered copper carbonate 2 ozs. per bushel.
(5) Treated with powdered copper sulphate 2 ozs. per bushel.

The experiment was divided into three sections—

(1) Planted immediately after treatment.
(2) Planted 14 days after treatment.
(3) Reinfected 14 days after treatment and sown.

Two hundred seeds were sown in each plot. The number of plants reaching maturity, the percentage of bunted plants, and the amount of grain from each plot was obtained. The results were as follows:—

Table I.—Comparison of Fungicidal Dusts with Standard Fungicides for Control of Smut—Burnley School of Horticulture, 1920.

Treatment.	Percentage of Plants that reached maturity.	Percentage of Plants smutted.	Weight of Grain obtained.
	%	%	grams.
Section I.—*Grain Sown Immediately after Treatment.*			
1. Soaked in water	78	66.7	615
2. Soaked in Bluestone, 2% for three minutes	69	5.1	1,345
3. Soaked in Formalin, 1 in 400 for three minutes	61	26.3	1,192
4. Copper Carbonate Dust, 2 ozs. per bushel ..	83.5	12.0	1,723
5. Copper Sulphate Dust, 2 ozs. per bushel ..	62.0	0.8	1,808
Section II.—*Grain Soun* 14 *Days after Treatment.*			
1. Soaked in water	79.5	91.9	171
2. Bluestone 2 per cent.	46.5	7.6	886
3. Formalin 1 in 400	34.5	33.4	646
4. Copper Carbonate Dust	82.0	9.2	1,996
5. Copper Sulphate Dust	84.5	17.8	1,127
Section III.—*Grain Reinfected and Sown* 14 *Days after Treatment.*			
1. Soaked in Water	69.5	86.4	382
2. Bluestone, 2 per cent.	50.5	10.9	999
3. Formalin, 1 in 400	17.5	65.8	90
4. Copper Carbonate Dust	78.0	10.9	1,834
5. Copper Sulphate Dust	82.0	16.5	1,604

The seeds were heavily dosed with smut spores before treatment.

The table shows several interesting features. The highest proportion of plants reaching maturity was obtained from seed treated with copper carbonate or copper sulphate dust.

The greatest yield per plot was obtained from seed treated with copper carbonate. When seed treated with bluestone or formalin solutions was sown immediately after treatment the results were fairly satisfactory, but where the seeding was delayed for fourteen days the vitality of the seed and the yield per plot was greatly depressed.

Only 34.5 per cent. of the seed treated with formalin matured when the seeding was delayed for fourteen days, and where the seed was reinfected and the seeding delayed, only 17½ per cent. of the plants reached maturity.

With seed treated with copper carbonate, delayed sowing did not affect the germination.

The first section of the experiment was repeated in 1921, 1922, 1923, using 200 seeds per plot. The fungicides used were formalin 1 in 450 and bluestone 1½ per cent. The average results for the four years are summarized in the following table:—

TABLE II.—COMPARISON OF VARIOUS FUNGICIDES FOR CONTROL OF SMUT—BURNLEY—AVERAGE OF 4 YEARS, 1920-1923.

Treatment.	Percentage of Plants reaching maturity.	Percentage of bunted Plants.	Average yield per plot.
	%	%	grams.
Untreated	69.6	70.8	311
Copper Sulphate, 1½ per cent.	58.6	2.5	950
Formalin, 1 in 450	51.4	11.1	852
Copper Carbonate Dust, 2 ozs. per bushel ..	75.4	4.9	1,251
Copper Sulphate Dust, 2 ozs. per bushel ..	65.0	2.5	1,196

For the four-year period the best results were obtained from powdered copper carbonate. This showed the highest percentage of plants reaching maturity, and gave the highest average yield per plot. The copper sulphate dust showed 10 per cent. lower germination than copper carbonate, but a higher percentage of clean plants. The yield per plot was slightly lower than that treated with copper carbonate dust.

Both fungicidal dusts were superior to the standard pickling solutions in regard to the percentage of plants that reached maturity, and the yield per plot. When sowing was delayed for fourteen days the superiority of the fungicidal dusts was very marked.

The delayed sowing tests and reinfection tests were repeated in 1923 except that formalin, 1 in 450, and bluestone 1½ per cent. solution were substituted for the stronger solutions used in 1920, with the following results:—

TABLE III.—COMPARISON OF VARIOUS FUNGICIDES FOR CONTROL OF SMUT IN WHEAT, BURNLEY, 1923.

Treatment.	Percentage of Plants reaching maturity.	Percentage of Plants bunted that reached maturity.	Yield per plot.
	%	%	grams.
I.—Treated Seed Sown Immediately.			
Soaked in water	81	68·0	508
Bluestone, 1½ per cent.	80	3·1	1,218
Formalin, 1 in 450	70	12·9	1,008
Copper Carbonate, 2 ozs. per bushel ..	88	6·2	1,427
Copper Sulphate, 2 ozs. per bushel ..	72	7·0	1,232
II.—Seed Sown 14 Days after Treatment.			
Soaked in water	79	91·1	116
Bluestone, 1½ per cent.	53	7·6	840
Formalin, 1 in 450	41	39·0	530
Copper Carbonate, 2 ozs. per bushel ..	87	9·8	1,218
Copper Sulphate, 2 ozs. per bushel ..	88	9·6	1,204
III.—Seed Reinfected and Sown 14 Days after Treatment.			
Soaked in water	77	81·8	216
Bluestone, 1½ per cent.	56	9·8	820
Formalin, 1 in 450	28	60·8	197
Copper Carbonate, 2 ozs. per bushel ..	85	10·0	1,176
Copper Sulphate, 2 ozs. per bushel ..	77	8·0	1,081

These results show very clearly the value of the fungicidal dusts, especially where the sowing is delayed. The percentage of plants reaching maturity and the yield per plot is in every case highest where the seed is treated with copper carbonate.

Powdered copper sulphate is nearly as effective as copper carbonate, and is superior to the same fungicide in the form of a 2 per cent. solution where sowing is delayed.

Method of Using Fungicidal Dusts.

The application of the fungicidal dusts may be made in various ways. Special machines have been invented for the purpose of applying the dust, but in the absence of these the powder may be applied by emptying a number of bags of wheat on a concrete floor and sprinkling the requisite quantity of powdered copper carbonate or copper sulphate upon the heap and then shovelling the heap of grain over several times until the material is thoroughly mixed. This method does not, however, give the most uniform distribution, and the fine particles of dust cause irritation to the worker.

The first machine used for pickling wheat was the Ross-Martin pickling machine, designed by Mr. H. Ross, Inspector of Agriculture, New South Wales.

Quantity of Fungicidal Dust Required for Pickling.

The amount of copper carbonate dust recommended by Dr. Darnell Smith is 2 ozs. per bushel. Two ounces of copper carbonate finely ground will effectively cover a bushel of seed. Heavier dressings have been used in America without any apparent injury to the grain. Probably lighter applications would be quite effective for seed with only a light infection of smut. The question of the rate of application of the fungicide is a matter of importance in view of the relatively high cost of the material. We know that 2 ozs. per bushel is adequate for smut control even with heavily bunted seed. What is the minimum quantity of powdered copper carbonate dust that would prove effective for smut control? This is a matter worthy of investigation, for if lesser quantities of the dust will be effective one drawback to the extensive use of the copper carbonate will be removed.

Use of Copper Carbonate in the United States.

Copper carbonate dust has been extensively used in America for treating seed for smut. Last year over 1,000,000 lbs. of this material was manufactured mainly for use in pickling seed. Investigations carried out by the Washington and Californian Agricultural Experiment Stations show that this fungicide has given much better results than either formalin or bluestone. The stations referred to comment very favorably on the dry copper carbonate method for treating seed.

Standards for Copper Carbonate.

Copper carbonate to be effective must be reasonably pure, containing from 52 to 54 per cent. of copper, very finely divided. The finer the subdivision the more effective the carbonate is in its action on smut.

It should be fine enough to pass through a sieve of 200 meshes to the inch.

It should be of a light green colour and never blue. The density after being shaken down in a dry state should not be over 32 lbs. per cubic foot.

Imported copper carbonate complying with these standards costs about 1s. 6d. per lb. Probably local manufacturers will shortly be able to supply material of the same quality at this price.

SUMMARY.

From the experiments recorded above it appears that finely-divided fungicidal dusts are superior to the standard fungicides for treatment of seed for smut. Finely-pulverized copper carbonate is effective in killing smut spores and does not appear to have the same depressing influence on germination and vitality of the grain as the standard solutions of formalin and bluestone, especially in cases where the sowing is delayed for a fortnight. This latter point is of practical importance, as it permits treatment of seed in advance of seeding.

It is usually applied at the rate of 2 ozs. per bushel, either by a specially constructed pickling machine or by mixing on a concrete floor. Applied at the above rate the fungicide is quite effective in controlling smut except where the seed has been very heavily infected with bunt spores.

The cost of the material is high in comparison with standard fungicides, but the benefits gained, *i.e.*, better germination, greater vitality of seed, and a high degree of efficiency against reinfection of seed, more than compensate for the higher cost. The great practical advantage of the method lies in the fact that the treatment of the seed may take place some weeks prior to seeding without material injury to the vitality of the grain. Finely-pulverized copper sulphate (bluestone) is nearly as effective as copper carbonate. It appears to be more effective than copper carbonate dust for killing smut spores, but it slightly effects the vitality of the grain, but not to the same exent as a standard solution of bluestone.

HAY-STACK BUILDING COMPETITION.

Under the Auspices of the Geelong Agricultural Society.

Report of the Judge, H. A. Mullett, B.Ag. Sc., Senior Inspector of Agriculture.

The General Methods of Stack Building.

Judging by the number of slovenly-built hay-stacks that are to be seen dotted about the average farm, even in the recognised hay-growing districts, stack-building is becoming a lost art with us; yet there was a time when people took a great pride in their stacks. As the necessity for weather and vermin protection is certainly no less to-day than it was twenty years ago, it is difficult to account for the retrograde movement.

There are some who would saddle all the blame on to the high cost of labour on the farm. They point out that nowadays farmers are forced to rush the hay into the stacks so fast that the man stacking cannot handle it as carefully as he did once, especially when the hay is elevated by mechanical means.

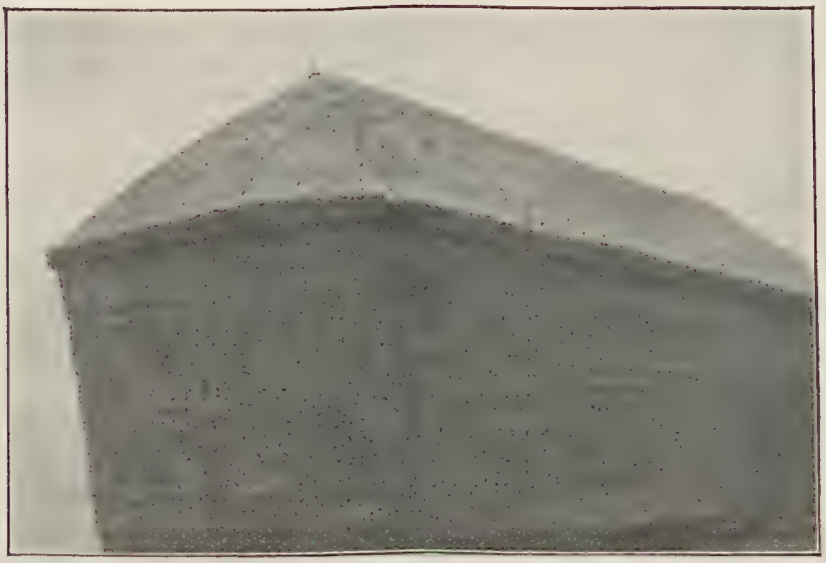
As every one knows, a stack built reasonably slowly settles more regularly, and hence is generally more symmetrical than one rushed up with an elevator. The use of an elevator is also conducive to the fault of dumping the sheaves all on one position, leading to undue tramping and consolidation of the part and, later, to excessive local springing, and, possibly, canting of the whole stack to that side. But skilled stack-builders can build as neat a stack with a hay-elevator as without, and the slow method of "kneeling the sheaves" is not essential, for there are good stackers who use nothing but a fork. In any case, rapid work should only affect a stack superficially, such as in the regular alignment of the butts of the sheaves in the rows in the walls, or perhaps in the general symmetry of the body, not the stack's powers of turning water; but it is just in the latter point that so many modern stacks fall short. That is because certain simple principles—independent of speed, are not observed. The chief rule is to keep the stack well "hearted" up in the centre from the time the first row of sheaves is laid down. Many young builders regard this as a mere fad of the older generations, and wait until the eaves have been put on before they build what is called a "false heart," but in such a stack a cross section would show the sheaves in the body lying canted downwards towards the centre, or at best, horizontal. This means that any rain which may penetrate the roof gravitates steadily towards the centre of the stack, and there is a tendency for driving rain to penetrate the sides to too great a distance. On the other hand, in a stack where the sheaves cant outwards and downwards there is no such danger. In a finished stack the fault mentioned may be detected by means of a probe, and, of course, is noticeable in a stack from which a "bench" or two has been cut.

The second rule to follow is to permit the walls of the stack to "spring" out to a reasonable degree. The walls of a well-sprung stack, especially if capped by a good eave row, can only be wetted by driving rain, and then only by rain falling directly on the place. The rain

caught on the roof should drip off the eave row, and little, if any, that falls on the sides should collect and run down them.

To spring the walls of a stack too much is just as bad a fault as springing them too little. In the former case, there is the danger of the stack slipping at, or soon after building; and in the latter all the rain that collects on the sides runs down them, wetting the ends of the sheaves in the lower layers unduly. To spring a stack properly requires the judgment that comes from experience. The springing is, of course, caused by the outward pressure from the heavy mass of sheaves piled in the heart of the stack. Many, when they notice the outward movement of the walls, draw in each successive row of sheaves too much, consequently the walls are perpendicular, or may even incline towards the centre of the stack.

In a big stack the spring may, if not checked, become so great as to menace the stability of the walls. The builder should endeavour to



The Winning Stack—Mr. W. J. Muhlebach. (Builder, Mr. A. J. Baker.)

check this by placing the butts of the successive rows slightly inside the butts of the row lower down. In a stack where the walls are 14 or 15 feet to the eaves when settled, a total spring of 2 ft. 6 in. for each wall is not excessive, often more is given at the ends—up to 4 or even 5 feet.

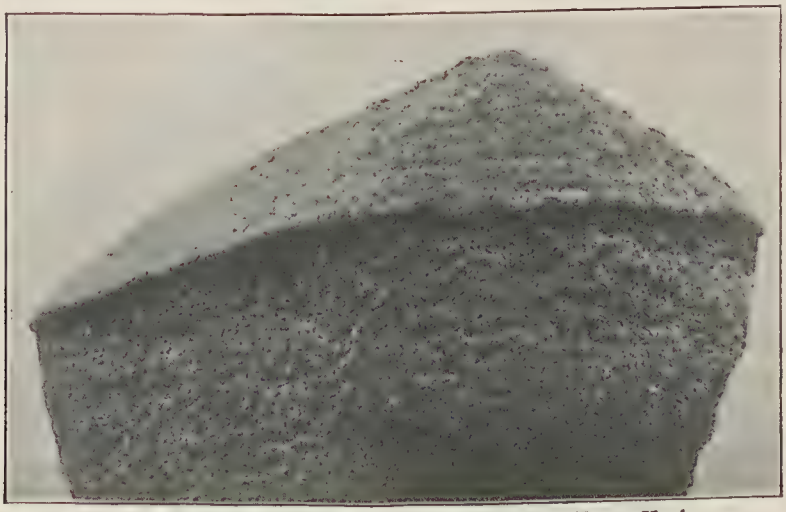
The eave row caps the walls like the eaves of a house. The butts of the sheaves in a good row should project 3 inches beyond the top row of sheaves at the walls. A number of young builders do not form this important part of a stack, because some little skill is required in placing it in position; others render it practically useless by placing the butts of the first row of roof sheaves too far behind the butts of the eave row. In this even a large portion of drainage from the roof may get inside the stack.

Finally there comes the roof, nowadays the first line of defence, when so many neglect to thatch.

The sheaves in the roof should be very closely packed, and the roof must be as steep as it is possible to make it, with the sheaves canted downwards and outwards at an acute angle. The ridging should be reasonably narrow, not broad and flat. A glance at the illustration on this page will show an almost perfect roof, especially in respect to the manner in which the roof abuts the eave row.

The Geelong Competition.

The Geelong Agricultural Society deserves praise for reviving the Stack-building Competitions in its district. These competitions were popular in the days of ploughing matches, and both rendered important service in the perfecting of the art of a generation of farmers who were highly skilled in the technique of agriculture. That old spirit needs reviving. Werribee has been holding a Stack Competition for some years. Melton, Ballarat, and other hay-growing centres could follow



Second Prize Stack—Owned and Built by Mr. H. G. Heal.

suit, then an inter-district championship might be held. The nett result would be an enhanced interest in stack-building and the development of greater technical skill among stack-builders.

Eight entries were inspected in the various districts—Batesford, Anakie, Moolap, Barrabool Hills, Little River, and Lara, all within a radius of 25 miles of Geelong.

The conditions drawn up by the Society provided for the award of points for the butt, the roof, the eave row, for protection from fire and vermin, for drainage, and for general appearance—a well-balanced scale of points. It was stipulated that thatching should not be judged, but special attention was paid to the roof and the general lie of the sheaves in the stack as disclosed by probing.

Excessive attempts to obtain neatness by undue trimming the ends of sheaves in the walls and eave rows were not encouraged, in order that the judging should be confined to commercial points as far as possible.

Results.

The winning stack was entered by Mr. W. J. Muhlebach, of Retreat Farm, Batesford, and was built by Mr. A. J. Baker. Eighty-nine points were scored. It was a very neat stack of about 70 tons. Judging by probing, it has been kept exceptionally well-hearted up from the first few rows. The roof, which was thatched, had a steep pitch and projected well on to the eave row, which was well defined and regular.

The alignment of the sheaves in the rows had been given careful attention, and they were closely packed. The regularity with which the stack had settled was clearly defined by the parallelism of the butts of the successive rows of sheaves. This indicates careful building. The whole was placed on a new mouse-proof stack-stand. The only fault that could be detected was that one of the walls was not sprung outwards sufficiently; otherwise the stack was almost perfect.

An even better stack was that built and owned by Mr. H. G. Heal, of Lara. No provision, however, had been made for vermin protection,

The most Symmetrical Stack in the Competition—Mr. E. Thompson. (Builder, Mr. J. Anderson.)

consequently only 13 out of 20 points were scored under the heading "Safety." Even so, 84 points were scored—5 behind the winner.

Mr. Heal's stack had not had the same care bestowed on the alignment of the sheaves, and their ends had not been so well butted in the binder, and no attempt had been made to dress them by hand; all the same, in every essential it was a most excellent stack. It was particularly good in the roof, which was steep and closely packed with sheaves appropriately canted. It was especially satisfactory in the way the first row of the roof abutted the ends of the eave row. The eave row was regular and projected well. The sheaves in the butt had a good cant outwards. The springing, though not very pronounced, was, nevertheless, regular throughout and continuous from eaves to base. Had this stack been vermin proof it would have won the competition.

Mr. Thompson, of Moolap, gained 80 points and third place. His was probably the most symmetrical stack in the competition, and was

enclosed in a vermin-proof enclosure. Points, however, were deducted for insufficient hearting up of the butt and for a somewhat flat roof. The overhang of the walls was ample and regular. It amounted to about 2 feet on each side with 4 feet on each end. On a base 20 yards by 6 yards the stack was estimated to contain 90 tons.

Mr. E. Browne's stack consisted of Warden wheat. It was built on a slope. It was relatively tall in the wall and high in the roof for its size—both good points—but the probe disclosed that the sheaves in the butt had no well defined cant outwards and downwards.

Mr. T. W. Heal's stack was symmetrical enough, but somewhat straight in the walls, and had apparently not been hearted up right from the base.

Messrs. Leigh Bros.'s stack was a good average stack; the roof was not quite as acutely pitched as it might have been, but the roof sheaves had a good downward cant. The eave row could have been more defined, and the butt was somewhat unsymmetrical.

The stack entered by Messrs. G. F. Austin and W. Welsh was built by Mr. J. P. Murnane. It was a beautifully sprung stack, but this had been overdone at one of the ends, which showed signs of having slipped at a corner. The roof was too flat, and the eave row had been blown off one side as the stack was being built, consequently the drainage from the roof was liable to penetrate the stack.

Mr. H. Farrer's stack was built by the exhibitor. This stack was high in the walls and tall in the roof, but the butt was not sufficiently sprung except at the end. There was no eave row. The sheaves in the butt exhibited no downward cant.

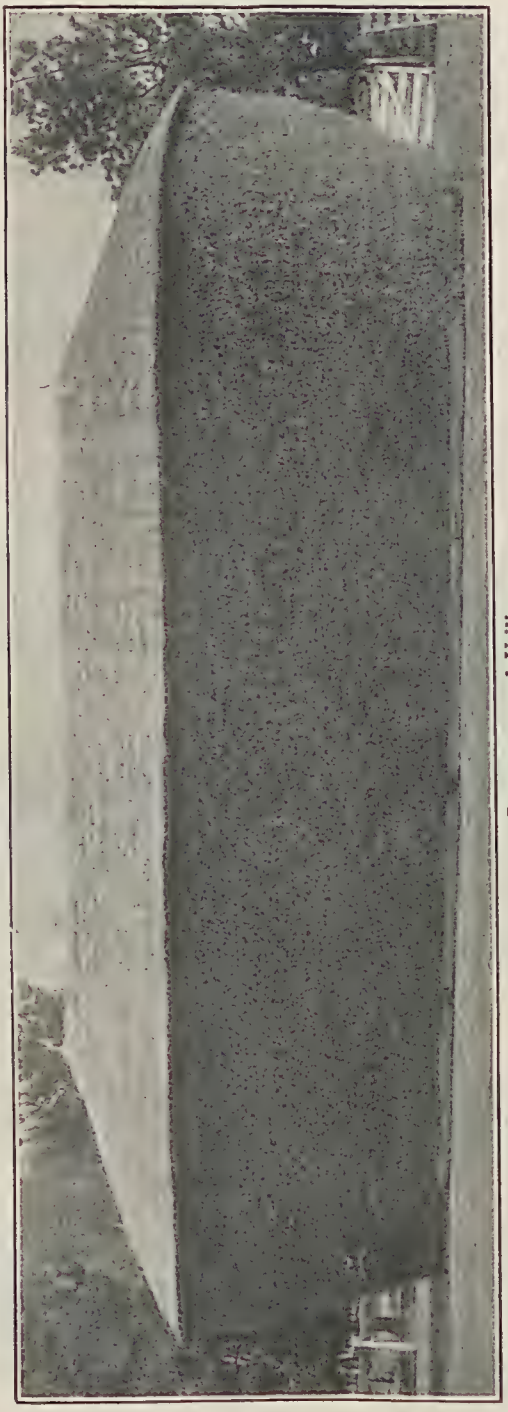
Details of Award.

Competitor.	Builder.	Roof.	Eave Row.	Butt.	General Appearance.	Safety.	Total.
W. J. Muhlebach ..	A. J. Baker ..	26	10	14	19	20	89
H. G. Heal	H. G. Heal ..	29	9	16	17	13	84
E. Thompson ..	J. Anderson ..	21	6	17	18	18	80
E. Browne	E. Browne ..	28	7	12	14	15	76
F. W. Heal	F. W. Heal ..	20	7	14	17	12	70
Leigh Bros.	F. Leigh ..	22	6	15	15	12	70
H. Farrar	H. Farrar ..	29	..	13	13	14	69
F. Austin and W. Welsh	J. D. Murnane	18	4	18	14	10	64

Methods Used in Building Competing Stacks.

Mr. A. J. Baker, who built the winning stack, started from the centre, which he immediately hearted up with 5 or 6 loads. The sheaves were placed butts outward throughout the stack. All sheaves were placed in position by hand on their edges and were knelt on

In building each successive row the butts were placed half-way between the butt and the band of the sheaf below. Each layer was built from the edge to the centre, and, where necessary, extra rows were put in from time to time to keep the heart well up. The direction of building was alternated with each successive layer. As far as possible, care was also taken to avoid pitching the sheaves from successive loads from the same place.



Symmetry and Utility.

The sheaves from the eave row projected from the band; the five succeeding layers were only slightly drawn in, in order to insure that the drainage from the roof will not penetrate the stack, then the roof sheaves were drawn in in a regular manner. This stack of oaten hay measured 56 feet by 19 feet, with 14-ft. walls, and about 10 feet from the eaves to the roof. It was estimated to contain 70 tons.

Mr. H. G. Heal, the builder of the second prize stack, was not present at the time of judging; therefore, an account of his methods cannot be furnished. It is understood, however, that the stack was

A Wasteful and Untidy Method of Stacking Hay.

built entirely with a fork, starting from a stook in the centre and laying all sheaves but the outside row and the roof heads outward.

Mr. J. Anderson, the builder of the symmetrical third prize stack, also starts from a stook in the centre, and builds butts of the sheaves outwards throughout. Near the edge of the stack the butts of binding rows are placed on the bands of the sheaves beneath, but as the heart of the stack is reached the butts of the upper sheaf are placed closer to the butts of the lower sheaf. This tends to keep the stack hearted. The eave row is generally overhung 6 inches.

TOBACCO CULTURE.*

By Temple A. J. Smith, Tobacco Expert.

The Value of Fertilizers.

Tobacco curing is now (July) in full swing in this district (Tipton, Georgia), and I have been fortunate in making friends of some leading growers, and also in finding a fine Government Experimental Farm, known as the Georgia Coastal Plain Experimental Farm, on which many very interesting tobacco and other experiments are being carried out. The United States of America Agricultural Department is fortunate in having men like Mr. S. A. Starr as Director, with Messrs. Hart and Davis, and others, in charge of the different branches of the work.

Though known as the Coastal Plain, this farm is situated 175 miles from the sea-board. The soil is sandy, grey, and is very poor in appearance, and actual analysis shows very low potash, nitrogen, and phosphate content; yet some nice crops of tobacco, estimated to yield up to 1,400 lbs. of cured leaf per acre, are being harvested. The height above sea-level is only 300 feet, and, generally speaking, the land looks sour and unattractive. There is a large area in Victoria in North-east Gippsland, lying north of the railway line to Orbost, and round Buchan and the Cann River Settlement, which would compare favorably with the land here for tobacco and other crops, at present neglected from an agricultural point of view.

With heavy fertilizing, a crop of maize will produce 25 bushels, and no attempt is made to grow any crop with less than 400 lbs. of mixed fertilizer per acre. The effect of certain fertilizer on tobacco crops here is, in some instances, very marked. Where potash is not applied, disease is liable to occur, and the growth is feeble. Too little nitrogen affects the growth, and too much retards ripening. Heavy applications of superphosphate appear to be most valuable, and have influences altogether apart from their food value alone. Where heavy dressings are given, the tobacco crop ripens four to five weeks earlier than where little or no superphosphate is applied; the leaf colours much better, and is of smoother and nicer quality. This is, perhaps, the more curious in view of the fact that the tobacco plant is a small feeder on phosphoric acid. No tobacco-grower will attempt to produce high-class leaf without heavy applications of superphosphate, and Victorian tobacco soils, which are, generally speaking, short of phosphoric acid, should respond to dressings of superphosphate in improving the quality of tobacco-leaf. The fact that one result of the use of this fertilizer shortens the season of growth by four weeks would be of much value in saving loss from frosts, also one month's labour in the field, and would ripen the leaf at a time when curing is more easily accomplished. When all these advantages are taken into consideration, the cost of, say, 400 lbs. of superphosphate per acre would be compensated in the saving of labour alone, while the land would be left in better order for any succeeding crop.

* Extracts from reports written by Mr. Smith while investigating the tobacco industry in America. These have been unavoidably held over till now.

The system of rotation that has so far proved best here is tobacco, rye, fallow, and only one crop of tobacco is grown on the same land in three years. Tests with Crimson Clover, Soy Beans, go to show that tobacco does not follow legumes with advantage, but certainly does well after Irish Rye, which is not allowed to ripen. To get the best effect from it, it should be fed off during the winter and ploughed in when from 6 to 10 inches high. It should be sown as early in the autumn as possible after the tobacco crop is taken off, and it will thrive on the surplus fertilizers left in land. It does not appear that Victorian soils will require heavy dressings of potash, or nitrogenous fertilizers, for a time, but some assistance with sulphate of potash—1 cwt. per acre—and a mixture of nitrogenous fertilizer in small quantities—say 1 cwt. of half-and-half sulphate of ammonia and blood mixture—would probably have a good effect.

The class of tobacco-leaf produced here would be very suitable for our manufacturers, being a bright, full-bodied leaf, giving a fairly heavy yield per acre. All the best growers follow the priming system when harvesting—that is pulling the leaves as they ripen and taking them straight to the barn, which is filled in one day and the fires started immediately the barn is full.

Log barns are most fancied, and tight barns are favoured most. All the tobacco I have seen cured is more easily yellowed than the Victorian leaf. This is due partly to the use of superphosphate, partly to the lighter types of soil in which the crop is grown, and possibly, to some extent, to the humidity in the atmosphere—which is high.

Harvesting, &c.

There are several systems in vogue here for transporting leaves to the barn which might be adopted by Victorian growers with advantage, and also methods of handling to save time and expense.

The leaf, when cured, is not tied in hands, as is the case in Victoria; but is packed loose in heaps on canvas and carted in this condition to the warehouses, where it is sold by auction on the floors, and brings prices averaging around 25 cents, or 1s. per lb., which is considered a profitable price. Crops in this district during the current season have suffered from too much rainfall, and a disease known here as Wildfire has done a considerable amount of damage. This disease has not yet found its way into Australia, so far as I am aware. There is a possibility of its being introduced by imported seed, and I am of opinion that all imported seed should be treated to prevent this and other tobacco diseases from reaching Australia. Taken altogether, the tobacco crops in this country will be short this season, and of poor quality, as compared with recent years. This is the opinion of growers generally, the average of both quantity and quality being estimated at about 70 per cent., due to the unfavorable season experienced.

The Marketing of Tobacco.

I have attended open market sales at Richmond, the capital of Virgina; Oxford, a big tobacco centre; Durham and Greenwood, South Carolina. The system of marketing appears to me a very imperfect

one from the sellers' point of view, as growers simply have to take any price offered, and have practically no say in the sale of their tobacco-leaf. Should they feel dissatisfied with the price, they can withdraw their lots of tobacco; but I was informed when these are re-submitted for sale they invariably bring a lower price than the first offer.

The open market means that at which all the leaf belonging to growers who are not members of the Tobacco Growers' Association is sold by auction. The tobacco-leaf grown by members of the association is pooled, regraded, and put through a drying machine, and packed in tierces or hogsheads, and sold in large or small lots, as required, to manufacturers or exporters.

In Oxford, North Carolina, there are no less than six warehouses, each with very large floor space, and buyers go from warehouse to warehouse to buy the hundreds of small lots under offer. Sales take place every day of the week except on Saturdays and Sundays during the selling season. The amount of tobacco-leaf sold in North Carolina in 1921 was no less than 240,902,496 lbs., the average price for that year being just under 1s. per lb. In 1922, the quantity sold was 200,572,891 lbs., the average price being 1s. 1¾d. per lb. The bright tobacco, in 1921, produced in Virginia, North and South Carolina, Georgia, and Rocky Mount, totalled 358,996,306 lbs., which sold at an average price of 11d. per lb. These figures give some idea of the immensity of the tobacco industry in these States alone, and do not include the Kentucky, Burley tobaccoes, the cigar tobaccoes, and heavy dark leaf. The total weight of all tobacco sold annually in the United States of America being about 1,500,000,000 lbs.

Owing to the humid atmosphere and scarcity of barn room, the majority of growers find it difficult to hold their tobacco after curing, and the crop is taken in small lots of from 300 to 1,500 lbs. on light waggons to the warehouses, and placed on trays on the floor in loose order, and in four or five grades. Some parcels sold are no more than 25 lbs., some others range up to 500 lbs. Each lot is ticketed with a number and the weight of the parcel. The owner's name not being shown.

From 500 to 1,000 lots may be sold on each floor in one day. The auctioneer is preceded by a warehouse employee, who indicates the parcel to be sold, and starts each lot at a price which he considers just below its value; and the auctioneer, in a continuous chant, takes the bids and knocks down each lot to the buyer when he considers a limit has been reached. Each lot is sold, on an average, in 60 seconds, and clerks following note down the individual buyer's purchases, which are at once taken to the warehouses, where they are regraded and dried, and prepared for market.

So far as I could learn, there were not more than six buyers operating, and apparently there was no reason why they could not agree beforehand on the prices to be paid. I spoke to several growers about the system of selling, and though all seemed dissatisfied with the methods of sale employed, no one was able to suggest an improvement. Much time appears to be wasted by growers in bringing in such small parcels of leaf and spending the day waiting for the tobacco to be sold—and hundreds do this several days a week for a season of from three to

six months. Even the "Co-ops.," as the members of the Association are called, waste much time in delivering small quantities.

The leaf grown in North and South Carolina and Virginia has the reputation of being the finest-flavored tobacco grown for making cigarette and pipe tobaccoes, and consequently commands a better price than many others. The grower, however, has no voice in fixing the value when his tobacco is sold on the open market, and great dissatisfaction is expressed with the methods of marketing employed. The growers' association seems to be the solution of the trouble; but, unfortunately, it appears impossible to get all producers to join up, consequently, about 40 per cent. of the tobacco grown is forced on to the market early each year, and prices are forced down. The crop, as a whole, this year is said to be below the average in quality, and so far as I can learn, only one really good crop is produced in every four years. New districts are being devoted to tobacco culture, and this expansion will probably be justified when Europe settles down and is able to take her quota of the crop.

DAIRY FARM COMPETITION.

LEONGATHA SOLDIER SETTLERS.

Report of the Judge, Mr. J. S. McFadzean, Senior Dairy Supervisor.

The judging of the Third Annual Dairy Farm Competition at Leongatha took place on 21st and 22nd February. There were eight competitors, five of whom had competed in other years. The winner of the two previous events did not enter on this occasion.

The inspection shows that reasonable improvement is being made in regard to cultivation and care of pasture land, but only in one instance was there any headway seen in stock-breeding.

Each of the new entrants has a young pure-bred bull. The purchase of such a bull is the first step towards stock improvement; but, unless a few of the very best of the bull's progeny are raised each year for future dairy work, the owner will not get full value for his outlay. Farm-raised heifers of this class are good property, but continual buying of other people's cull cows will never result in a satisfactory herd. In pigs also little attention is being given to breeding shapely animals, most of those seen being crossbred stock showing no evenness. The progeny of a well-bred sow will bring in much better returns for food consumed than those of a crossbred.

One of the competitors had just come through a protracted course of hospital treatment, and his farm could not be expected to have any chance of winning a prize. Another had been dairying for only a few months, and was thus at a big disadvantage. However, it costs nothing to enter, and there is always something to be gained in such competitions.

All the competitors had made ample sowings of fodder crops, but these showed much variation in growth; some also were much freer

from weeds than others, and consequently gave better promise of maturing satisfactorily. Hay, maize, mangels, and millet are grown on nearly all the farms—the mangel being a particularly useful fodder, as it keeps well over the winter and is relished by all stock.

Horses were in every instance of a fairly good class, and only those suitable for the farm working were being kept. The homesteads were generally very tidy, and in two particular instances flower gardens round the residences added much to the appearance of the place. Fruit trees and shelter trees are doing well. In general management there is, however, plenty of room for progress all round. Some of the cultivation and cropping is rather roughly carried out. Both stock-breeding and winter-fodder storage fall far short of what is required for best results. In the handling of cream there is also evidently room for improvement, as quite a big percentage of this produce was not in the "Choicest" grade on the factory returns. However, the owners appear to know where they are not quite up to standard, and so are likely to improve further each year. On the whole, they have put in much hard and effective work, and are to be congratulated on having their farms so well advanced in such a short period of occupancy.

One feature which was particularly gratifying this year was that very few rabbits were in evidence, and the cattle were consequently in very fair condition everywhere. Closer settlement, such as Leongatha has carried out, is the satisfactory solution of the rabbit problem. Only by handling land in small areas will ferns and scrub be got rid of, and until such rubbish is cleared off the land, rabbits will breed freely and destroy grass.

There is no question as to the Leongatha district benefiting much from the subdivision of its larger farm areas, for this annual Farm Competition amongst the settlers is bringing good results in many ways. It creates discussion, which serves to advertise the good quality of the land, making its productiveness more widely known. Every one of the competitors naturally feels that he must make a good showing against the rest, with the result that all make headway. In these competitions, the winning of the prize is possibly the least important consideration, for, as the result of their friendly rivalry, every one is a gainer to the extent of a much greater cash value than the prize. Merely to be a competitor in one of these events stirs up the sporting spirit, and nothing can be more advantageous to the district than to maintain a widespread spirit of emulation in the work of making every farm a success.

The Leongatha Agricultural Society is, indeed, to be congratulated on the way it has achieved this. It might, however, add just a little to it by putting on two classes at their annual show for the best pure-bred bull and four of his female progeny at the ages of about eight and twenty months. This would give an incentive to the raising of heifers, and when they came into milk the owners would realize their value. One-third of the total points might be allotted to the sires and two-thirds to the progeny.

Both in stock and produce some of the soldier settlers have already shown that they can hold their own with any of the district farmers, so that after about three years these classes for sire and progeny could be made open to all holders of land under 150 acres in area. The entries could be judged by three of the Society's committee inspecting them on the farm, and only the best groups need then be brought to the show grounds.

The whole value of a pure-bred bull lies in his progeny, and if, for such competition, even half-a-dozen good heifers were raised on a number of farms each year, the quality of the dairy stock would rapidly improve throughout the district.

A tabulated result of the competition, showing the points scored by each entrant, is shown on the next page.

Section.	Possible Points.	Edwards, D. W.	Bright, G. H.	Kinnish, W. D.	Edwards, G. H.	Calder, E. L.	Amos, Vic.	Maddern, R. T.	Hogan, J. C.
Crop rotation	40	10	30	30	30	30	30	25	25
Crops for dairying	40	28	20	35	20	35	30	20	30
Condition of grass	20	12	18	15	10	15	12	12	12
Suitability of cattle	50	28	30	30	35	32	30	23	25
Suitability of pigs	15	8	8	8	8	8	3	8	8
Suitability of horses ..	15	12	12	12	12	12	12	12	12
Suitability of poultry ..	3	2	2	2	..	2	2	2	2
Suitability of other stock ..	7	..	..	..	..	..	..	..	..
Equipment of farm	20	12	12	12	10	12	14	12	12
Arrangement of buildings ..	25	12	15	15	12	20	20	17	12
Water supply	10	7	7	7	8	7	7	7	7
Fodder supply	20	12	15	15	12	15	15	12	12
Subdivision, gates, fencing, &c.	10	7	7	7	7	7	7	7	7
Shelter for stock	5	2	2	2	2	2	2	2	2
Orchard and garden ..	10	7	8	8	6	6	6	6	6
Home and surroundings ..	20	12	15	15	12	12	12	12	12
General management ..	40	20	24	24	22	22	24	24	22
Factory returns	50	11	34	24	17	29	30	12	20
Totals	400	202	259	261	223	266	256	213	226

Result.

Mr. E. L. Calder ..	266 points ..	.. 1st
Mr. W. D. Kinnish ..	261 points ..	.. 2nd
Mr. G. H. Bright ..	259 points ..	.. 3rd
Mr. V. Amos ..	256 points ..	.. 4th

TREATMENT OF BREEDING POULTRY STOCK.

By W. C. Rugg, Chief Poultry Expert.

A number of poultry breeders complain each year of infertility amongst their breeding stock, and also, that often their best layers do not come into lay until late in the season, with the result that the chickens hatched are slow to mature, and often of quality inferior to the parent stock. Much of this trouble would be avoided if poultry men gave their breeding stock a little attention at the right time of the year and prepared them for the coming season. A great many cases came under my notice last year of men who, to get early chickens, had to breed from pullets (many of which were immature), because their older hens had been kept laying right up to the breeding season, and just as their owners wanted their eggs to incubate these hens were moulting and resting.

There is no doubt that it is breeding from this immature stock that is the cause of so many small under-weight eggs coming on to the market. This is a much more serious matter than many poultrymen think, and unless they alter their methods it will mean ruination to themselves and a serious set-back to the poultry industry of Victoria.

Our State has an ideal climate for the production of every kind of food necessary for the development of all varieties of poultry, and therefore the day should not be far distant when poultrymen will have to seriously consider an export trade. With this in view it is absolutely necessary that breeders should at once realize the advisability of adopting better methods, and give more attention to the breeding stock that are to produce the birds whose eggs will enable us to compete successfully in the egg markets on the other side of the world. In my travels through the State I meet far too many men who are sacrificing the constitution and stamina of their birds for high single test records, which are often obtained under artificial conditions of feeding and housing. The general result of using these coddled hens as breeders is stock of poor constitution.

If we consider the life of some of these hens such a result is not to be wondered at. In the first place the chicken is hatched under artificial conditions, and confined with an artificial mother till six or eight weeks old. She is then too often placed with a crowd of others in a shed, or sometimes a small run, with little grass and small range, and when about five months old put into a single pen, to be under control for twelve months, in order that her record may be ascertained. When she moults—very often still under cover—she is mated probably to a cockerel that has been hatched, brooded, and reared under the same conditions.

In my opinion it is impossible to keep up the stamina of our birds if we continue to breed under these conditions. Do what you like with those intended for layers—put them in sheds and get them to lay all the eggs they will; but where birds are wanted for breeding purposes, let them be reared under natural conditions: give them as much free range as possible, and feed them on only plain wholesome meals, succulent greenstuff, and clean grain.

Many poultry breeders make the mistake of thinking that the breeding season starts in July, whereas the preparation of the breeding stock should begin in March. All the birds likely to be wanted in the breeding pens should be selected in this month, and they should be placed in pens away from the laying flock. Their diet should be of the plainest description, very little mash, but plenty of succulent greenstuff, and the grain ration should largely consist of plump Algerian oats. The object is to get these hens to rest, and to encourage them to moult by feeding a little sulphur or boiled linseed in the mash occasionally. This will help them to grow a new set of feathers, and then they will be ready to lay by the time the eggs are wanted for early hatching operations.

The selection of breeding stock should be on the basis of vitality and constitutional vigour. If selection be made on records alone, and only the highest producers used as breeders, without due consideration being given to the birds, size, type, and constitution, the stock will deteriorate. If birds are selected without these qualities they will not reproduce stock with the health and perfect digestive organs so

necessary to the pullets which are expected to lay large numbers of eggs.

I would strongly advise poultrymen never to place at the head of their breeding pen a male bird the mother of which laid eggs of less than two ounces, and never to incubate an egg that does not weigh two ounces. This is, I am sure, the only way by which the size of eggs laid by a flock will be increased.

A very important thing to remember is that the best and strongest chickens are hatched from the first twenty or thirty eggs that a hen lays after her moult.

ARTICHOKES FOR PIG RAISING.

The Jerusalem artichoke was first introduced into England in the early part of the 12th century from the north-eastern parts of North America, and has since been grown chiefly as an esculent vegetable in gardens. On the Continent of Europe it is not only used for human food, but it is cultivated as a farm crop, and utilized for the feeding of horses, cattle, sheep, and pigs. It possesses many qualities which recommend its more frequent cultivation in the British Islands as food for stock, especially on the poorer types of soil, and in waste corners of the farm where little else could be profitably grown.

It is a perennial, and bears thick underground rhizomes or tubers, which vary considerably in form and size, being in certain sorts somewhat like an irregularly-shaped roundish potato, in others much longer. These tubers bear several buds, and unlike the potato give off thin fibrous roots. The external colour of the tubers may be purple, yellow, or white. When placed in the ground the buds upon them grow, and produce coarse, hairy, erect stems, which come above ground and ultimately reach a height of from 5 to 8 feet or more. The lower leaves are generally opposite and cordate-lanceolate, the upper ones ovate and alternate.

In the hottest parts of Southern Europe the plants generally flower, the heads resembling small yellow sunflowers about the size of marigolds, in which ripe seed is sparingly produced. In the more southern parts of France and Germany, and in the British Islands, the Jerusalem artichoke rarely flowers except in very hot seasons, and then does not ripen seed.

The plant is not fastidious in its soil requirements, nor in its demands for light or shade. It grows well under trees and flourishes on almost all classes of soil from dry sands to strong clays; on peat and on gravels it thrives also. The best results, however, are obtained on sandy loams with good drainage. On account of its want of seed formation it is propagated by planting tubers.

The land should be cleaned and trenched, and a good dressing of farmyard manure added in the autumn, with about 3 cwt. of superphosphate of lime on the lighter classes of soil, or 5 cwt. of basic slag

on heavier land. Where the land is sandy or gravelly, an application of 3 cwt. of kainit is beneficial, especially where only a sparing amount of farmyard manure is put on. For good results, manure should be given every two or three years. In spring the tubers are planted usually in September, about 3 inches deep, in runs 2 feet to 2 ft. 6 in. apart and 20 inches asunder in the rows. In some places on the Continent planting is carried on in the autumn months, especially on ground which is fairly dry and well drained. Where the tubers are small it is best to plant two or three together, but one larger tuber, planted like a potato, gives the best returns; the stems from small tubers being generally thin and spindly, and the yield small. The weight of tubers needed to plant an acre is from 12 to 15 cwt.

It is necessary to keep down weeds by hoeing for a time after the young shoots are up; but later, when the stems and leaves are well developed, they shade the ground and stifle out undergrowth of all kinds. The tubers may be dug up in autumn and stored in the same manner as potatoes, or left in the ground during the winter and dug up when needed in spring, the latter being perhaps the better plan. Although the tubers may become frozen, they are not damaged in any way if they are allowed to thaw in the ground—a fact, no doubt, in some way connected with the cell sap and the nature of the stored food materials in it, which is referred to later. When once planted and properly established on a piece of ground, no replanting is needed for many years, as the small tubers which remain in the soil when the main crop is dug are sufficient to start the crop again. The fact that every small tuber or piece of tuber will grow makes it exceedingly difficult to eradicate the plant when once established. The crop should therefore only be grown on ground which would otherwise be wasted or unremunerative. It is difficult to state what is the average yield of a crop of Jerusalem artichokes, as it varies so much with the treatment the crop receives, and the kind of soil on which it is grown; but, generally speaking, the yield is smaller than that of a crop of potatoes grown on similar ground. The tubers are excellent food for all kinds of stock, either raw or boiled. They contain about 80 per cent. of water and about 2 per cent. of albuminoids—about the same as in potatoes. Unlike the latter, the Jerusalem artichoke stores up little or no starch, the chief carbohydrates in the tubers being grape sugar and a peculiar soluble compound termed inulin, which is allied to grape sugar and starch. The soluble carbohydrates amount to about 15 or 16 per cent.

The young leaves and stems are sometimes cut and fed in a green state to cows and sheep, which thrive well on them; but when this practice is followed the yield of tubers is diminished considerably. They contain 68 per cent. of water, 3½ per cent. of albuminoids, 17½ per cent. of soluble carbohydrates, and about 5½ per cent. of crude fibre.

—*New Zealand Farmers' Advocate,* 16.6.23.

STALLION PARADES.

TIME TABLE, 1924.

Provided that the applications for registration received indicate that a horse will be in attendance there for examination, a parade will be held at each of the following places :—

No. and Date.	Parade.	Time.	Officer Arrives.	Officer Departs.
Every Saturday from June 30 to Dec. 20	Agricultural Offices	10 a.m.		
No. 1.				
Monday, June 23 ..	Dunolly ..	1.41 p.m.	1.41 p.m. ..	3.35 p.m.
Monday, June 23 ..	Maryborough	4.30 p.m.	4.30 p.m. ..	10.18 p.m.
Tuesday, June 24 ..	Mildura ..	2 p.m. ..	8 a.m. ..	7.25 a.m. (25th)
Wednesday, June 25..	Ouyen ..	10 a.m. ..	9.35 a.m. ..	Driving
Wednesday, June 25..	Walpeup ..	12 noon ..	Driving ..	Driving
Wednesday, June 25..	Underbool ..	2 p.m. ..	Driving ..	Driving
Wednesday, June 25..	Tutye ..	3.30 p.m...	Driving ..	Driving
Wednesday, June 25..	Murrayville..	4.30 p.m.	Driving ..	Driving
No. 2.				
Monday, June 23 ..	St. Arnaud	3.30 p.m.	3.22 p.m. ..	12.7 a.m. (24th)
Tuesday, June 24 ..	Speed ..	9 a.m. ..	4.12 a.m. ..	10.54 a.m.
Tuesday, June 24 ..	Woomelang	11.45 a.m	11.45 a.m. ..	11.52 a.m. (25th)
Wednesday, June 25..	Watchem ..	1.30 p.m.	1.32 p.m. ..	6.52 p.m.
Thursday, June 26 ..	Curyo ..	9 a.m. ..	Driving ..	Driving
Thursday, June 26 ..	Birchip ..	11 a.m. ..	Driving ..	1.5 p.m.
Thursday, June 26 ..	Donald ..	2.30 p.m...	2.13 p.m. ..	5.55 a.m. (27th)
No. 3.				
Tuesday, June 24 ..	Sea Lake ..	10 a.m. ..	9.10 p.m. (23rd)	Driving
Tuesday, June 24 ..	Nandaly ..	12 noon ..	Driving ..	Driving
Tuesday, June 24 ..	Kulwin ..	3 p.m. ..	Driving ..	Driving
Wednesday, June 25..	Culgoa (Railway Station)	9 a.m. ..	Driving ..	9.54 a.m.
Wednesday, June 25..	Wycheproof (Railway Station)	11.40 a.m.	11.40 a.m. ..	12.25 p.m.
Wednesday, June 25..	Charlton (Railway Station)	1.5 p.m.	1.5 p.m. ..	1.22 p.m.
No. 4.				
Tuesday, July 1 ..	Dimboola ..	9.30 a.m.	6.5 p.m.(June 30)	11.45 a.m.
Tuesday, July 1 ..	Rainbow ..	2.45 p.m...	2.45 p.m. ..	3.50 p.m.
Tuesday, July 1 ..	Yaapeet ..	4.40 p.m...	4.40 p.m. ..	5.30 p.m.
Wednesday, July 2 ..	Kaniva ..	2 p.m. ..	2.28 a.m. ..	12.42 a.m. (3rd)
Thursday, July 3 ..	Jeparit (Railway Station)	10.8 a.m.	10.8 a.m. ..	10.55 a.m.
Thursday, July 3 ..	Lorquon (Railway Station)	12.5 p.m.	12.5 p.m. ..	12.5 p.m.
Thursday, July 3 ..	Yanac (Railway Station)	1.20 p.m...	1.20 p.m. ..	1.40 p.m.
No. 5.				
Tuesday, July 1 ..	Goroke ..	3 p.m. ..	1.15 p.m. ..	6 p.m.
Wednesday, July 2 ..	Horsham ..	9 a.m. ..	9.5 p.m. (1st) ..	5.50 p.m.
Thursday, July 3 ..	Natimuk ..	10 a.m. ..	7 p.m. (2nd) ..	Driving
Thursday, July 3 ..	Toolondo ..	12 noon ..	Driving ..	Driving

STALLION PARADES, TIME TABLE—*continued.*

No. and Date.	Parade.	Time.	Officer Arrives.	Officer Departs.
No. 6.				
Monday, June 30 ..	Mitiamo (Railway Station)	1.37 p.m.	1.37 p.m. ..	1.53 p.m.
Monday, June 30 ...	Pyramid (Railway Station)	2.20 p.m...	2.30 p.m. ..	7.10 a.m. (1st)
Tuesday, July 1 ..	Raywood ..	11 a.m. ..	9.18 a.m. ..	12.50 p.m.
Tuesday, July 1 ..	Tandarra ..	1.5 p.m. ..	1.4 p.m. ..	4.42 p.m.
Wednesday, July 2 ..	Bendigo ..	10 a.m. ..	6.10 p.m. (1st)	12.12 p.m.
Wednesday, July 2 ..	Marong ..	1 p.m. ..	12.41 p.m. ..	5.13 p.m.
Thursday, July 3 ..	Maldon ..	11.45 a.m.	11.37 a.m. ..	Driving
Thursday, July 3 ..	Shelbourne ..	1.30 p.m...	Driving ..	Driving
Thursday, July 3 ..	Castlemaine	4 p.m. ..	Driving ..	8.38 p.m.
Friday, July 4 ..	Newstead ..	10.30 a.m.	9.12 p.m. (3rd)	11.31 a.m.
No. 7.				
Monday, June 30 ..	Ballan ..	10.15 a.m.	10 a.m. ..	12.2 p.m.
Monday, June 30 ..	Bacchus Marsh	1 p.m. ..	12.34 p.m. ..	Driving
Monday, June 30 ..	Melton ..	3 p.m. ..	Driving ..	8.50 p.m.
Tuesday, July 1 ..	Riddell (Railway Station)	2.14 p.m.	2.14 p.m. ..	2.46 p.m.
No. 8.				
Tuesday, July 8 ..	Hopetoun ..	11 a.m. ..	9.40 p.m. (July 7)	7.20 a.m. (9th)
Wednesday, July 9 ..	Warracknabeal	2 p.m. ..	10 a.m. ..	7.30 p.m.
Thursday, July 10 ..	Beulah ..	9.30 a.m...	9.5 p.m. (9th) ..	12.5 p.m.
Thursday, July 10 ..	Minyip ..	3.15 p.m...	3.10 p.m. ..	11.45 a.m. (11th)
Friday, July 11 ..	Murtoa (Railway Station)	12.35 p.m.	12.35 p.m. ..	1.10 p.m.
No. 9.				
Monday, July 7 ..	Rupanyup (Railway Station)	4.40 p.m...	4.40 p.m. ..	5.5 p.m.
Tuesday, July 8 ..	Marnoo ..	9.30 a.m.	6.25 p.m. (7th)..	11 a.m.
Tuesday, July 8 ..	Lubeck (Railway Station)	1.20 p.m.	1.20 p.m. ..	1.30 p.m.
Tuesday, July 8 ..	Stawell ..	2.25 p.m...	2.25 p.m. ..	7.35 p.m.
Wednesday, July 9 ..	Ararat ..	2 p.m. ..	8.35 p.m. (8th)..	6.20 a.m. (10th)
Thursday, July 10 ..	Avoca ..	9.30 a.m.	8.20 a.m. ..	Driving
Thursday, July 10 ..	Navarre ..	11.30 a.m.	Driving ..	Driving
No. 10.				
Monday, July 7 ..	Macorna ..	3 p.m. ..	2.50 p.m. ..	11.17 p.m.
Tuesday, July 8 ..	Koondrook..	9.30 a.m...	Driving ..	Driving
Tuesday, July 8 ..	Kerang ..	2 p.m. ..	Noon	3.55 p.m.
Wednesday, July 9 ..	Piangil ..	9.30 a.m.	Driving ..	Driving
Wednesday, July 9 ..	Manangatang	11 a.m. ..	Driving ..	Driving
Wednesday, July 9 ..	Chillingollah	Noon ..	Driving ..	Driving
Wednesday, July 9 ..	Ultima ..	3 p.m. ..	Driving ..	Driving
Wednesday, July 9..	Lalbert ..	4 p.m. ..	Driving ..	Driving
Thursday, July 10 ..	Swan Hill ..	10 a.m. ..	Driving (9th) ..	12 noon

Stallion Parades, Time Table—*continued.*

No. and Date.	Parade.	Time.	Officer Arrives.	Officer Departs.
No. 11.				
Monday, July 14 ..	Royal Show Grounds	10 a.m.		
No. 12.				
Monday, July 21 ..	Tungamah ..	1.30 p.m...	1.21 p.m. ..	3.21 p.m.
Monday, July 21 ..	Devenish ..	4 p.m. ..	4 p.m. ..	8.43 p.m.
Tuesday, July 22 ..	Yarrawonga	11 a.m. ..	9.52 p.m. (21st)	3.10 p.m.
Wednesday, July 23..	Benalla ..	9.30 a.m.	5.10 p.m. (22nd)	11.25 a.m.
Wednesday, July 23..	Rutherglen	2 p.m. ..	1.53 p.m. ..	7.50 a.m. (24th)
Thursday, July 24 ..	Barnawartha	2 p.m. ..	1.25 p.m. ..	3.23 p.m.
No. 13.				
Monday, July 21 ..	Tallangatta..	4 p.m. ..	3.53 p.m. ..	Driving (22nd)
Tuesday, July 22 ..	Corryong ..	12.30 p.m.	Driving ..	6 a.m. (23rd)
Wednesday, July 23..	Wodonga (Railway Station)	12.45 p.m.	12.45 p.m. ..	3.5 p.m.
No. 14.				
Wednesday, July 23..	Inglewood ..	11 a.m. ..	10.2 p.m. (22nd)	1.29 p.m.
Wednesday, July 23 ..	Boort ..	4.26 p.m...	4.26 p.m. ..	5 p.m.
Thursday, July 24 ..	Quambatook	10 a.m. ..	6.23 p.m. (23rd)	11.5 a.m.
Thursday, July 24 ..	Korong Vale	2.32 p.m...	2.32 p.m. ..	1.30 p.m. (25th
Friday, July 25 ..	Wedderburn Junction	2 p.m. ..	1.45 p.m. ..	3.39 p.m.
No. 15.				
Monday, July 28 ..	Kyabram ..	1.30 p.m...	12.4 p.m. ..	Driving
Monday, July 28 ..	Tongala ..	3 p.m. ..	Driving ..	3.42 p.m.
Tuesday, July 29 ..	Tatura ..	10.30 a.m.	5 p.m. (28th) ..	11.30 a.m.
Tuesday, July 29 ..	Echuca ..	1.15 p.m...	1.15 p.m. ..	3.45 p.m.
Tuesday, July 29 ..	Rochester ..	4.30 p.m...	4.25 p.m. ..	9.3 a.m. (30th
Wednesday, July 30	Elmore ..	11 a.m. ..	9.40 a.m. ..	12.51 p.m.
Wednesday, July 30	Bamawm ..	3 p m. ..	Driving ..	Driving
Thursday, July 31 ..	Gunbower ..	4 p.m. ..	4 p.m. ..	Driving
Friday, August 1 ..	Cohuna ..	11 a.m. ..	Driving ..	1.30 p.m.
No. 16.				
Monday, July 28 ..	Moyhu ..	2 p.m. ..	Driving ..	Driving
Monday, July 28 ..	Whitfield ..	4 p.m. ..	Driving ..	Driving
Tuesday, July 29 ..	Wangaratta	11 a.m. ..	Driving ..	12.39 p.m.
Tuesday, July 29 ..	Bright ..	4.7 p.m. ..	4.7 p.m. ..	6.4 a.m. (30th)
Wednesday, July 30	Myrtleford ..	2 p.m. ..	7.12 a.m. ..	7.12 a.m. (31st)
Thursday, July 31 ..	Beechworth	11 a.m. ..	9.50 a.m. ..	12.51 p.m.
Thursday, July 31 ..	Everton ..	2 p.m. ..	1.11 p.m. ..	3.30 p.m.
Friday, August 1 ..	Euroa ..	10 a.m. ..	6.27 p.m. (31st)	11.10 a.m.
Friday, August 1 ..	Seymour ...	1 p.m. ..	12.8 p.m. ..	4.58 p.m.

STALLION PARADES, TIME TABLE—*continued.*

No. and Date.	Parade.	Time.	Officer Arrives.	Officer Departs.
No. 17.				
Monday, July 28 ..	Dookie (Railway Station)	12.48 p.m.	12.45 p.m. ..	1 p.m.
Monday, July 28 ..	Katamatite (Railway Station)	2.8 p.m. ..	2.5 p.m. ..	2.50 p.m.
Tuesday, July 29 ..	Nagambie (Railway Station)	9 a.m. ..	7.7 p.m. (28th)	10.5 a.m.
Tuesday, July 29 ..	Shepparton..	2 p.m. ..	11.20 a.m. ..	8.45 p.m.
Wednesday, July 30	Numurkah ..	11 a.m. ..	9.37 p.m. (29th)	12.24 p.m.
Wednesday, July 30	Strathmerton	12.47 p.m.	12.47 p.m. ..	1.7 p.m.
Wednesday, July 30	Cobram ..	2 p.m. ..	1.44 p.m. ..	3.20 p.m.
Thursday, July 31 ..	Nathalia ..	2 p.m. ..	1.32 p.m. ..	3.26 p.m.
Friday, August 1 ..	Murchison ..	10 a.m. ..	6.42 p.m. (31st)	10.45 a.m.
Friday, August 1 ..	Rushworth..	11.48 a.m.	11.48 a.m. ..	12.25 p.m.
Friday, August 1 ..	Colbinabbin	1.30 p.m...	1.20 p.m.	2.30 p.m.
No. 18.				
Monday, August 4 ..	Heathcote ..	2 p.m. ..	10.30 a.m. ..	6.23 p.m.
Tuesday, August 5 ..	Alexandra ..	2 p.m. ..	12.33 p.m. ..	4.5 p.m.
Wednesday, August 6	Yea ..	9.30 a.m...	6.25 p.m. (5th)..	10.30 a.m.
Wednesday, August 6	Mansfield ..	2 p.m. ..	1.40 p.m. ..	3.30 p.m.
Thursday, August 7	Kilmore ..	9 a.m. ..	8.30 a.m. (driving)	9.40 a.m.
No. 19.				
Tuesday, August 5 ..	Casterton ..	11 a.m. ..	7.40 p.m. (4th)..	Driving
Tuesday, August 5 ..	Coleraine ..	3 p.m. ..	Driving ..	Driving
Wednesday, August 6	Edenhope ..	12 noon ..	Driving ..	Driving
Wednesday, August 6	Harrow ..	2 p.m. ..	Driving ..	Driving
Wednesday, August 6	Balmoral ..	3 p.m. ..	Driving ..	Driving
No. 20.				
Tuesday, August 5 ..	Dartmoor ..	11 a.m. ..	9 p.m. (4th) ..	9.55 a.m. (6th)
Wednesday, August 6	Heywood ..	11.45 a.m.	11.45 a.m. ..	12.15 p.m.
Wednesday, August 6	Portland ..	1.30 p.m...	1.5 p.m. ..	8.30 a.m. (7th)
Thursday, August 7	Branxholme	10.55 a.m.	10.55 a.m. ..	11.15 a.m.
Thursday, August 7	Dunkeld ..	1.30 p.m...	1.30 p.m. ..	3.53 p.m.
Thursday, August 7..	Hamilton ..	4.33 p.m...	4.33 p.m. ..	Driving (8th)
Friday, August 8 ..	Cavendish ..	10 a.m. ..	Driving ..	Driving
No. 21.				
Monday, August 11 ..	Dean's Marsh	11.35 a.m.	11.30 a.m. ..	2.40 p.m.
Monday, August 11 ..	Birregurra ..	3.5 p.m. ..	3.5 p.m. ..	7.55 p.m.
Tuesday, August 12 ..	Colac ..	10 a.m. ..	8.22 p.m. (11th)	10.55 a.m.
Tuesday, August 12 ..	Gellibrand (Railway Station)	12.54 p.m.	12.18 p.m. ..	Continues journey by same train
Tuesday, August 12 ..	Beech Forest	2.10 p.m...	2.10 p.m. ..	2.45 p.m.
Wednesday, August 13	Winchelsea..	10 a.m. ..	7.51 p.m. (12th)	11.13 a.m.

STALLION PARADES, TIME TABLE—*continued.*

No. and Date.	Parade.	Time.	Officer Arrives.	Officer Departs.
No. 22.				
Monday. August 11..	Beaufort ...	2 p.m. ..	12.35 p.m. ..	6.40 p.m.
Tuesday, August 12..	Willaura ..	10 a.m. ..	8.15 a.m. ..	2.19 p.m.
Tuesday, August 12 ..	Maroona ..	2.38 p.m...	2.38 p.m. ..	2.45 p.m.
Wednesday, August 13	Nhill ..	3 p.m. ..	1.31 a.m. ..	1.32 a.m. (14th)
No. 23.				
Monday, August 11 ..	Port Fairy ..	4 p.m. ..	2.50 p.m. ..	6 a.m. (12th)
Tuesday, August 12 ..	Koroit ..	11 a.m. ..	6.36 a.m. ..	Driving
Tuesday, August 12..	Hawkesdale	2 p.m. ..	Driving ..	3.27 p.m.
Tuesday, August 12 ..	Penshurst ..	4.11 p.m...	4.11 p.m. ..	7.32 a.m. (13th)
Wednesday, August 13	Warrnambool (Railway Station)	10.15 a.m.	10.15 a.m. ..	10.55 a.m.
Wednesday, August 13	Terang ..	12.30 p.m.	12.5 p.m. ..	1.10 p.m.
Wednesday, August 13	Mortlake ..	1.45 p.m...	1.45 p.m. ..	Driving
Thursday, August 14	Camperdown	11 a.m. ..	5.35 p.m. (13th)	12 noon
Thursday, August 14	Timboon ..	1.45 p.m...	1.45 p.m. ..	2.55 p.m.
Thursday, August 14	Cobden ..	4.5 p.m. ..	4.5 p.m. ..	Driving
Friday, August 15 ..	Werribee ..	11.47 a.m.	11.47 a.m. ..	1.16 p.m.
No. 24.				
Monday, August 18 ..	Drysdale ..	11 a.m. ..	9.30 a.m. ...	4.6 p.m.
Tuesday, August 19 ..	Meredith ..	10 a.m. ..	9.42 a.m. ..	11.13 a.m.
Tuesday, August 19 ..	Bannockburn	2 p.m. ..	11.38 a.m. ..	4.23 p.m.
Wednesday, August 20	Lismore ..	12 noon ..	11.49 a.m. ..	Driving
Wednesday, August 20	Vite Vite ..	2 p.m. ..	Driving ..	4.52 p.m.
Thursday, August 21	Cressy ..	10.30 a.m.	6.12 p.m. (20th)	10.59 a.m.
Thursday, August 21	Westmere ..	2 p.m. ..	1.13 p.m. ..	4.7 p.m.
Friday, August 22 ..	Inverleigh ..	10 a.m. ..	9.40 a.m. ..	Driving
Friday, August 22 ..	Geelong ..	2 p.m. ..	12.10 p.m. ..	5.55 p.m.
No. 25.				
Monday, August 18 ..	Daylesford ..	Noon ..	11.59 a.m. ..	2.25 p.m.
Tuesday, August 19 ..	Waubra ..	10 a.m. ..	Driving ..	Driving
Tuesday, August 19 ..	Linton ..	2 p.m. ..	Driving ..	Driving
Tuesday, August 19 ..	Skipton ..	3 p.m. ..	Driving ..	Driving
Wednesday, August 20	Clunes ..	11 a.m. ..	8.39 a.m. ..	1.43 p.m.
Wednesday, August 20	Creswick ..	2.30 p.m...	2.16 p.m. ..	Driving
Wednesday, August 20	Kingston ..	3.30 p.m...	Driving ..	6.13 p.m.
Thursday, August 21..	Kyneton ..	10 a.m. ..	9.10 a.m. ..	Driving
Thursday, August 21..	Redesdale ..	2 p.m. ..	Driving ..	Driving
No. 26.				
Monday, August 18 ..	Morwell (Railway Station)	11.52 a.m.	11.52 a.m. ..	12.10 p.m.
Monday, August 18 ..	North Mirboo	3 p.m. ..	1.50 p.m. ..	4.25 p.m.
Tuesday, August 19..	Traralgon ..	10 a.m. ..	9.2 p.m. (18th)	12.20 p.m.
Tuesday, August 19 ..	Sale ..	2 p.m. ..	1.26 p.m. ..	6.20 a.m. (20th)
Wednesday, August 20	Maffra ..	9 a.m. ..	7.14 a.m. ..	11.19 a.m.
Wednesday, August 20	Cowwarr ..	2 p.m. ..	12.25 p.m. ..	5.1 p.m.
Thursday, August 21	Trafalgar ..	10 a.m. ..	6.51 p.m. (20th)	11.16 a.m.
Thursday, August 21..	Moe ..	Noon ..	11.31 a.m. ..	6.39 p.m.

STALLION PARADES, TIME TABLE—*continued.*

No. and Date.	Parade.	Time.	Officer Arrives.	Officer Departs.
No. 27.				
Monday, August 25 ..	Warragul ..	10.12 a.m.	10.12 a.m. ..	11.5 a.m.
Monday, August 25 ..	Neerim South	3 p.m. ..	12.20 p.m. ..	5.30 p.m.
Tuesday, August 26 ..	Bunyip ..	10 a.m. ..	9.38 a.m. ..	11.25 a.m.
Tuesday, August 26 ..	Pakenham ..	12 noon ..	11.54 a.m. ..	Driving
Tuesday, August 26 ..	Berwick ..	3 p.m. ..	Driving ..	9.19 p.m.
Wednesday, August 27	Cranbourne..	11 a.m. ..	8 a.m. ..	5.57 p.m.
Thursday, August 28	Woolamai ..	9.30 a.m...	8.35 p.m. (27th)	10.8 a.m.
Thursday, August 28	Wonthaggi ..	2 p.m. ..	10.55 a.m. ..	3.45 p.m.
Friday, August 29 ..	Lang Lang ..	9.15 a.m...	6.16 p.m. (28th)	9.51 a.m.
Friday, August 29 ..	Dandenong..	11.30 a.m.	11.16 a.m. ..	12.26 p.m.
No. 28.				
Monday, August 25 ..	Korumburra	10.30 a.m.	10.27 a.m. ..	Driving
Monday, August 25 ..	Leongatha ..	2.30 p.m...	Driving ..	11.12 a.m. (26th)
Tuesday, August 26 ..	Yarram ..	3.30 p.m...	2.20 p.m. ..	7 a.m. (27th)
Wednesday, August 27	Welshpool ..	10 a.m. ..	7.41 a.m. ..	11.20 a.m. (28th)
Wednesday, August 27	Foster Railway Station	12.10 p.m.	12.10 p.m. ..	12.40 p.m.
Wednesday, August 27	Stony Creek	2 p.m. ..	2 p.m. ..	2.10 p.m.
No. 29.				
Tuesday, August 26 ..	Mernda ..	11 a.m. ..	9.47 a.m. ..	1.42 p.m.
Tuesday, August 26 ..	Whittlesea ..	2.30 p.m...	2.6 p.m. ..	7.55 p.m.
Wednesday, August 27	Lilydale ..	2 p.m. ..	1.47 p.m. ..	5.8 p.m.
Thursday, August 28	Ballarat ..	11.30 a.m.	11.8 a.m. ..	3 p.m.
Friday, August 29 ..	Romsey ..	11 a.m. ..	10.40 a.m. ..	Driving
No. 30.				
Monday, September 1	Dromana ..	1.30 p.m...	1 p.m. ..	2.20 p.m.
Tuesday, September 2	Cowes ..	1 p.m.		
Wednesday, Sept. 3 ..	Stony Point	11 a.m. ..	11 a.m. ..	11.45 a.m.
Wednesday, Sept. 3 ..	Frankston ..	2 p.m. ..	12.41 p.m. ..	3.42 p.m.
No. 31.				
Tuesday, September 2	Orbost ..	10 a.m. ..	8.30 p.m. (1st)..	8.50 a.m. (3rd)
Wednesday, Sept. 3 ..	Nowa Nowa	10.30 a.m.	10.14 a.m. ..	Driving
Wednesday, Sept. 3 ..	Buchan ..	Noon ..	Driving ..	Driving
Thursday, September 4	Bairnsdale ..	Noon ..	11.20 a.m. ..	Driving
Thursday, September 4	Lindenow ..	2.30 p.m.	Driving ..	3 p.m.
No. 32.				
Tuesday, September 2	Omeo ..	3 p.m. ..	3 p.m. ..	5.30 a.m. (3rd)
Wednesday, September 3	Bruthen ..	3 p.m. ..	11.45 a.m. ..	9.45 a.m. (4th)
No. 33.				
Wednesday, September 10	Sunbury ..	11 a.m. ..	7.41 a.m. ..	3.6 p.m.
	French Island			
No. 34.				
Wednesday, September 17	Royal Show	1.30 p.m.		
Thursday, September 18	Royal Show	9 a.m.		

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

As soon as the fruit is off the trees, the land should be well ploughed and left in a rough condition until the spring ploughing. If not already done, and the orchard conditions demand it, there is still time to put in a leguminous crop for green manuring purposes. But this should be done as early as possible, so as to give the crop a chance to make some good early growth. Soils deficient in lime or in organic matter are always benefited by a crop of green manures. Where stable manure is unprocurable, the green manure crop is the only means of adding organic matter to the soil.

Pests and Diseases.

All second-hand and old cases should be thoroughly overhauled. It is preferable to do this work now, instead of leaving it till spring, when the rush of other duties will certainly prevent it being carried out. The cases, if not bad enough to be destroyed by fire, should be dipped for some time in boiling water. And this is not only for the killing of the codlin larvæ, but also to destroy larvæ or eggs of any scale or aphis, and also any spores of fungus diseases that may have found lodgment therein.

As soon as the trees have shed their foliage they may be sprayed with lime sulphur spray for woolly aphis, peach aphis, and the bryobia mite. And this should be done before pruning, so that in handling and carrying the prunings the pests will not be spread about the orchard to infect the clean portions.

In areas where Fruit Fly is suspected, a strict watch should be kept for perforated or infested fruit, all of which should be destroyed by boiling for forty minutes.

The Flower Garden.

Bulbs, tubers, and corms of spring-flowering plants should now all be planted. As they appear above ground, they should be protected from the ravages of snails and slugs, as these pests have a very great liking for these succulent growths. A good surface dressing of broken leaf or dust tobacco will effectually deal with these pests. In fact, the gardener who constantly uses tobacco, either in the leaf, stem, or dust forms, will very soon be in the happy position that slugs and snails will cause him no anxiety whatever. Besides, the tobacco has manurial properties which are also valuable.

Pansy and any other seedlings, also rooted layers and cuttings, may now be planted out into their permanent positions.

Sowings may also be made of any hardy annuals, such as antirrhinum, aquilegia, correopsis, Canterbury bell, dianthus, everlastings, foxglove, gaillardia, hollyhock, larkspur, leptosyne, lobelia, marigold, pansy, petunia, stock, sweet peas, verbena, wallflower, &c.

The Vegetable Garden.

There should now be no untidy or undug beds in the kitchen garden. The vacant beds should all be well dug over and prepared for the planting of vegetables for use in spring. In digging, a top dressing of manure should be given; this may be dug in. All weeds, too, may be forked into the trenches, and covered well with soil as each spit or length is dug. A dressing of lime is very beneficial at this time of the year three or four weeks after the manure or weed dressing.

A start should now be made at cleaning out the asparagus beds. This vegetable is most popular, and yet one rarely met with in ordinary household gardens. It is supposed to be difficult to grow, but this supposition is not borne out, as, once established, a bed of asparagus is one of the most easily managed plots in the whole garden. Depth of good soil and plenty of manure are all that this plant requires.

In establishing a new bed, it is advisable to see that there is a good depth of 2 or 3 feet of rich, well-manured soil. If this is not present, the soil should be dug out to that depth, and thoroughly mixed and enriched with well-rotted manure before being replaced. A bed deeply prepared, and supplied with ample quantities of manure, should last without replanting for very many years. The young plants or crowns should then be planted in trenches, keeping the rows 2 or 3 feet apart. An asparagus bed requires ample and direct exposure to the full rays of the sun. The asparagus should not be cut during the first season after planting; in fact, it is better to allow it to go uncut for two seasons. As little foreign weed growth as possible should be allowed in the beds, but, when they are not producing culinary asparagus, rows of lettuce, beans, radish, &c., may be grown between the crowns.

Towards the end of April the tops may be cut down, the beds cleaned, and a good top dressing of stable manure given. Chemical fertilizers, such as bonedust, sulphate of ammonia, and sulphate of potash, may be given as a substitute to organic manure. In the past it has been the custom to annually top-dress the beds with salt. It was supposed that, as asparagus in its native habitat was usually found in sandy soils near the sea-coast, the plant required salt or a saline soil to produce successful results. It has been found, however, that salt is not at all essential to good growth, and that the plant will readily adapt itself and grow well in soils of not at all a saline character. Where potash has taken the place of salt, quite improved results followed.

Seeds of onion, turnip, cabbage, cauliflower, carrot, and parsnip may now be sown.

REMINDERS FOR MAY.

LIVE STOCK.

HORSES.—Those stabled can be fed liberally. Those doing fast or heavy work should be clipped; if not wholly, then trace high. Those not rugged on coming into the stable at night should be wiped down and in half-an-hour's time rugged or covered with bags until the coat is dry. Old horses and weaned foals should be given crushed oats. Grass-fed working horses should be given hay or straw, if there is no old grass, to counteract the purging effects of the young growth. Attend to teeth and feet of horses to be turned out for the winter.

Cattle.—Cows, if not housed, should be rugged. Rugs should be removed in the daytime when the shade temperature is above 60 degrees. Give a ration of hay or straw, whole or chaffed, to counteract the purging effects of young grass. Cows about to calve, if over fat, should be put into a paddock in which the feed is not too abundant. Calves should be kept in warm dry shed. Observe strict cleanliness in feeding to avoid losses and sickness incidental to calf-rearing.

Pigs.—Sows not already served should be put to the boar. Supply all pigs with plenty of bedding, and see that sties are warm and well ventilated. Supply sows liberally with grain. Castrate young boars as early as possible. Pigs should be highly profitable now, as pork is very dear. Rape barley (especially skinless), oats, &c., may be sown for grazing during winter. Crushed oats will be the most economical feed for pigs at present prices.

Sheep.—Keep in-lamb ewes in strong condition. Best lambing results are obtained when ewes are neither too poor, nor excessively fat. Once the lambs arrive then the most liberal treatment possible is in the main the most profitable. Ill-fed ewes are bad mothers, indifferent to the new-born lamb, and rearing them badly afterwards, particularly very young or very old ewes. Select fine weather for lamb-marking. Yard lambs over night. Never castrate or tail high-conditioned lambs immediately on being run in and overheated. The risk with large lambs will be lessened if they are allowed to stay in the yards an hour or two after castration and the coagulated blood drawn, which in many cases will be found retained in the groin and purse, no matter what method of opening the purse is used. In tailing never draw tails tight. Projecting bone delays healing, especially when cutting off with hot blades. Even with the knife leave enough loose skin to come over and cover the vein and check the usual strong rush of blood from lambs on well-fed mothers.

Poultry.—Feed animal food to forward pullets, about ½ oz. daily, and equal parts heavy oats and broken maize at night. Add lucerne chaff to mash daily. See that fowl houses are free from draughts to avoid colds, also that they are free from red mites. Use Epsom salts freely to avoid Roup and Chicken Pox.

CULTIVATION.

Farm.—Dig main crop potatoes. Push on with ploughing and sowing of cereal crops, including peas and beans. Green fodder (as for April) may still be sown. Land for maize, potatoes, and other root crops should be prepared and manured. Flax may be sown. Transplant Chou Moellier and Giant Drumhead cabbage plants in rows 3 feet apart. Complete sowing permanent pastures with grasses and clovers.

Orchard.—Plough, manure; apply lime to orchard lands at rate or 5 or 10 cwt. per acre where soil is sour. Spray trees infested with scale insects, Woolly Aphis, and Bryobia Mite with red oil or crude petroleum. Clean all rough bark from trees. Commence pruning early varieties at end of month. Pick up and boil all fallen fruit.

Flower Garden.—Digging, manuring, and pruning; trench and drain where necessary. Dress the surface with lime. Continue to sow hardy annuals. Bury all leaves, soft-wood cuttings, and weeds. Continue to plant spring blooming perennials and other plants. Plant cuttings of carnations and roses.

Vegetable Garden.—Cut down and clean out asparagus beds. Apply manure and lime dressings. Cultivate deeply. Plant out seedlings and early potatoes; sow peas, broad beans, carrots, and parsnips.

Vineyard.—Subsoil land for new plantations if not already done. This work should be carried out as long before planting as practicable. Vine-growers are warned against the too common practice of feeding off foliage after vintage. Any small advantage in the form of stock feed is only gained at the cost of a reduction in the following season's crop, owing to interference with accumulation of reserves which continues so long as the leaves remain green. Sheep, or other animals, should not be allowed into the vineyard until the leaves have changed colour. Early and deep ploughing is strongly recommended. Manures should be applied as early as possible. Peas, &c., for green manuring, should be sown without delay, in order to take advantage of early rains.

Cellars.—Rack or fill up (preferably the former) dry wines as soon as a lighted match, introduced at bung hole, is no longer extinguished. Sweet wines should also be racked and fortified to full strength.

BEE-KEEPING.

May is the last month during which bees may be examined, handled, and, if necessary, fed without risk of endangering the existence of the colonies or seriously interfering with their safe wintering. Supers (upper stories) should be removed and stored indoors in a dry place, care being taken that bee moths cannot get access to the combs. Where suitable storage room is not available indoors, the boxes of spare combs may be left outside, but should be placed underneath the box containing the cluster of bees and the entrance to the hive contracted to one-third or fourth of the summer width.

Small colonies should be reduced to one set of combs in a single story, and any combs not covered by bees are best removed if the amount of stores is insufficient and has to be supplemented by feeding sugar syrup. The amount of honey or sugar syrup necessary to carry bees safely through the winter varies according to the strength of the colony, the locality, and the earlier or later flowering of the spring flora of the district. It is therefore not possible to state what the amount should be; it may, however, be laid down as a general rule that the combs which the bees cover at this time of the year should be at least more than half-full of sealed honey or sugar syrup. When sugar syrup has to be fed to supplement the stores it should be of the density of ripe honey, or approximately two (by weight) to one of water. The simplest way of making syrup is to pour the measured quantity of dry sugar into the correct amount of boiling water, keeping it on the stove and stirrring it till dissolved. The syrup should be given blood warm in a simplicity or frame feeder inside the hive.

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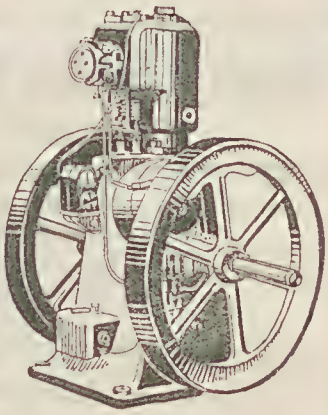

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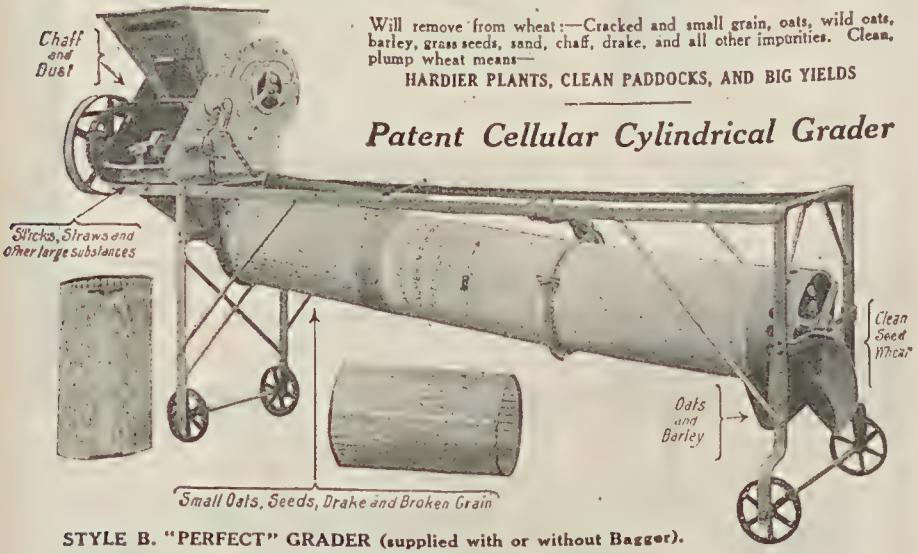
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Department of Agriculture, Victoria.

FRIESIANS FOR SALE

(1) Bull Calf *ex* Dominion Hyacinth (374)

Dropped 29th August, 1923

Sire: **Victoria Songboy (359)** by Dominion Domino Dutch Boy (73 F.H.B.A.), *ex* Dominion Madrigal (371 F.H.B.A.).

Sire of Dam: **Oak de Kol 2nd Homestead Fobes** (imp. to N.Z. from America) (341 N.Z.F.H.B.).

Dam's Record for 273 days under Government Herd Test—
11,512 lbs. Milk, 4·08 Test, 479 lbs. Butter Fat.

For Full Lactation Period—
13,898 lbs. Milk, 4·24 Test, 589 lbs. Butter Fat.

(2) Bull Calf *ex* Victoria Oakdale Lassie (996)

Dropped 24th September, 1923

Sire: **Victoria Jo Patch (345)** by Longbeach Big Patch (515 N.Z.F.H.B.), *ex* Dominion Madrigal (371).

Sire of Dam: **Dominion Oakdale (342)** by Oak de Kol 2nd Homestead Fobes.

Vict. Oakdale Lassie is now undergoing her 1st test.

Her Dam, Dominion Proud Lassie's Record for 273 days under Government Herd Test—
11,336 lbs. Milk, 3·42 Test, 387 lbs. Butter Fat.

For Full Lactation Period—
12,216 lbs. Milk, 3·51 Test, 428 lbs. Butter Fat.

(3) Bull Calf *ex* Dominion Woodnymph (988)

Dropped November, 1923

Sire: **Victoria Jo Patch (345)** by Longbeach Big Patch (515 N.Z.F.H.B.), *ex* Dominion Madrigal (371).

Sire of Dam: **Woodcrest Jo** (imp. to N.Z. from America) (334 N.Z.F.H.B.).

Dam's Record for 273 days under Government Herd Test—
10,610 lbs. Milk, 3·17 Test, 336 lbs. Butter Fat.

For Full Lactation Period—
13,240 lbs. Milk, 3·31 Test, 439 lbs. Butter Fat.

The record of the dam—DOMINION MADRIGAL—of the sires "Victoria Songboy" and "Victoria Jo Patch" for 273 days under Government Herd Test is 11,373 lbs. Milk, 3·93 Test, 448 lbs. Butter Fat; and for Full Lactation Period 13,485 lbs. Milk, 4·17 Test, 563 lbs. Butter Fat. "DOMINION MADRIGAL" is a full sister to "DOMINION QUEEN MERCEDES," third cow of all breeds under Government Herd Test 1923, and Winner "Weekly Times" Butter Competition, Melbourne Royal Show 1923, and Champion Melbourne Royal Show 1923.

(4) Cow "VICTORIA DUTCHMAID," 4 years old, due to calve on 17th April.
Sire: Dominion Domino Dutch Boy (73). *Dam:* Dominion Milkmaid (370).

(5) Heifer "VICTORIA BELLONA," 3 years old, due to calve in May.
Sire: Dominion Domino Dutch Boy (73). *Dam:* Dominion Belle Corona (369).

(6) Heifer "VICTORIA CORIANDER" 3 years old, due to calve on 1st April.
Sire: Dominion Domino Dutch Boy (73). *Dam:* Dominion Coringa (380).

Inspection of above Bull Calves and Heifers at the State Research Farm, Werribee, is invited.

Application for Purchase to—

DR. S. S. CAMERON, Director of Agriculture, MELBOURNE

DEPARTMENT OF AGRICULTURE, VICTORIA

Red Poll Dairy Herd

The Department has now completed the orders for calves that were booked ahead of calving when the advertisement was withdrawn; consequently the booking of orders for bull calves from the forthcoming calvings has now been resumed.

BULL CALVES are sold for delivery at a month old at prices based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter ***fat*** yielded. Thus a calf from a cow with a 400 lbs. butter fat record is sold for 20 guineas, one from a 300 lb. butter fat cow for 15 guineas, and so on. Bull Calves *ex* heifers on their first calf are sold for a set price of 10 guineas.

(For Record of Yields of dams see Red Poll Herd Book.)

The Bulls in Use include—

VICE REGAL (95 A.A.)

Sire: Nicotine (69 A.A.). Dam: Velveteen (Imp.) 22875 (2 A.A.).

VICTORIA VOLCANO (322 A.)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).

Dam: Tonga (253 A.) by Honingham Archbishop (imp.) 9702 (48 A.A.).

Tonga's butter fat yields for 6 successive lactation periods are as follow:—1916, 341 lbs.; 1917, 398 lbs.; 1918, 419 lbs.; 1919, 479 lbs.; 1920, 428 lbs.; 1921, 562 lbs.

BELLIGERENT (Imported) 11096 (8 A.A.)

Dam's Record (1st milking) 7144 lbs. milk.

Dam's Dam's	,,	14533 lbs. milk	...	4	years average	12871	lbs. milk.
Sire's Dam's	,,	10370	,,	... 7	,,	,, 9354	,,
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G. Sire's D. Dam's	,,	10215	,,	... 7	,,	,, 9386	,,
G.G. Sire's D. Dam's	,,	12565	,,	... 10	,,	,, 8853	,,
G.G.G. Sire's D. Dam's	,,	10088	,,	... 2	,,	,, 9754	,,

Inspection of the Herd is Invited.

Visitors will be met at the Station on notifying the Manager, State Research Farm, Werribee.

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Its main use is for grazing green, or when matured as a dry feed. In addition it is a great soil improver and of great value in choking out undesirable weed growth.

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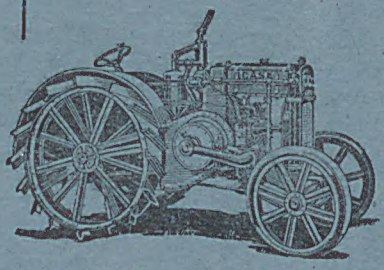

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